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Mr. SALTER.

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# CONTRACTION OF ŒSOPHAGUS

FROM

## CORROSIVE POISON.—GASTROTOMY.

---

By J. COOPER FORSTER.

---

JAMES G—, aged 4 years and 4 months, was admitted into Martha Ward the 2d of February, 1859, under Dr. Addison's care, in an extremely thin and emaciated condition. We are indebted to Mr. Fagge for the following history, obtained from the parents. Seventeen weeks before admission the child swallowed some corrosive poison, supposed to be a solution of potash, or caustic alkali, used for bleaching and cleaning linen; he was instantly seized with violent vomiting, bringing up frothy mucus, and either at the time or afterwards the vomited matter contained two or three teaspoonfuls of blood. For a few days he experienced some difficulty in swallowing, but under the care of the parish surgeon this passed off, and he apparently recovered. The little patient now continued comparatively well until a fortnight prior to admission, when the dysphagia returned, and gradually increased in severity. The history continues as follows:

He now complains of pain in the throat and epigastric region. He swallowed a quantity of beef tea two days before admission, but has taken nothing since, though he does his best to get something down, and overcome an obstruction which evidently exists. There is nothing to be seen on looking into the throat. The bowels are exceedingly costive, as might be expected.

February 4th.—The child being extremely feeble, and evidently very seriously ill, Mr. Cock saw him with Dr. Addison, with a view of some operative measure being resorted to, to relieve his present urgent symptoms; but it was not thought advisable to adopt any at this time. Injections of beef tea and wine were ordered every four hours, and any fluid he chose to ask for, to be given by the mouth.

5th.—He has swallowed the greater part of a cup of milk. Fomentations were ordered to be applied to the throat, and half a grain of calomel was given twice a day.

The report says, on the 15th, he is improving gradually. On the 18th the calomel was omitted.

March 9th.—He seems to have remained apparently stationary as regards his health to this time; but the difficulty of deglutition has evidently lately increased.

12th.—He has not swallowed anything for two days; is very exhausted, and appears sinking fast.

13th.—We saw this patient several times during the progress of the case, and were anxious to perform the only operation that appeared to offer any prospect of relief; but once or twice he seemed to swallow a quantity of fluid with apparent ease, which induced Dr. Addison to think it better to postpone any surgical interference until the present time. Accordingly on this day the little fellow was placed on a table, and chloroform administered. We then made an incision about two inches in length along the outer edge of the rectus muscle, in the left hypochondriac region, commencing at the cartilages, and opposite the space between the seventh and eighth ribs. The muscles and fasciæ were cautiously cut through, and several vessels tied which bled rather freely; the peritoneum was then exposed, and carefully divided on a director; coils of small intestine immediately appeared in the wound, but were held on one side, whilst two fingers were passed up to the diaphragm, to find the œsophageal end of the stomach. This part of the operation was attended with some difficulty. When, however, the stomach was reached, it was easily recognised by its thickened appearance and velvety feel; also, the greater curvature being the part exposed, the vessels passing along it, as also the descending portion of the great omentum, rendered it certain that the viscus now in view was

the stomach. An opening was immediately made into it, but a large vessel which was divided required ligatures at the two ends, as they bled profusely; the edges were then stitched carefully to the abdominal parietes by an uninterrupted suture, and the rest of the wound in the abdomen also closed by similar means. The operation was now completed. *ziss.* of chloroform was all that was used to produce perfect anæsthesia, and it did not give rise to sickness or any untoward occurrence afterwards. Prior to the operation the little patient lay apparently quietly sleeping; when addressed he understood what was said, but was not capable of answering; pulse was 82 and feeble; the breath cool, arms and hands cold, but legs and body tolerably warm. Half an hour after the operation the pulse was 120, and the boy certainly not more feeble than before.

Half an ounce of milk and egg, and egg and wine, were given alternately, through a tube passed into the stomach by the wound, every quarter of an hour for the first two hours; after that time the intervals of feeding were longer—every hour—and milk only was given. Nutritive injections were likewise administered every four hours, and retained.

On the day following the operation the little patient appeared comfortable, answered questions, of course was very feeble, with a pulse of 120. The milk diet was continued, and the nutritive injections of beef tea had an ounce of wine added to them; the feeding through the tube was continued every hour, night and day, unless he was soundly sleeping, which occurred at intervals.

On the Tuesday (the operation having been performed at eleven o'clock on Sunday morning) he seemed very comfortable, without any tenderness of the abdomen, and his general appearance indicated that he was in a most favorable condition, considering the important operation which had been performed; there was no peritonitis. The wound looked pretty well, though somewhat lacking power; the food evidently disappeared from the stomach, and passed into the intestines. He even attempted to swallow some milk by the mouth, and partially succeeded. Up to this time the patient had been carefully watched and tended by Messrs. Fagge, Greenwood, and Charlton, to whom we are much indebted for their attention.

On the Wednesday morning early he was very comfortable, and was being fed every hour and a half through the tube, and which he seemed to enjoy, nay, he even asked for "his poultice" (as he called it) when the time arrived for the nourishment being administered. About ten o'clock a.m., after having been fed, he suddenly complained of great pain over the abdomen; he became collapsed, cold, the eyes sunken, pulse almost imperceptible, quickly sank into a comatose state, and at two p.m. he died.

The *post-mortem examination* was made the next day by Dr. Wilks, and is as follows:

The body presented an extreme degree of emaciation.

A large part of the œsophagus was affected by the poison, but more especially its middle, which was much constricted, although a narrow passage still existed through it. The constriction was due to a great thickening and induration of the submucous tissue. About half of the tube corresponding to the middle portion had its walls thus thickened and calibre narrowed; the remainder, including the part above and part below, was differently affected. The latter was healthy, as regards its mucous membrane, walls, and size of tube; the former, that is, the part from the commencement of the œsophagus to the constricted part, was considerably dilated. This dilated part was healthy, as regards its mucous membrane, but there was a distinct fold of that structure, forming a kind of valve at the commencement of the œsophagus, and again at its junction with the strictured portion. As regards this latter part, where the narrowing of the tube commenced, the mucous membrane was gone, and there was a small sloughy spot; but below this, although the interior was of a dark colour, no ulceration was present, although the mucous membrane had probably been partly destroyed or abraded.

The external wound in the abdomen had commenced to slough, and the stitches had loosened from their hold. On opening the abdomen a general recent peritonitis was seen, evidently due to a giving way of the sutures, for some of the contents of the stomach were found within it, and lying between the liver and diaphragm; tender flakes of lymph covered various parts, and there was a little fluid serum. On lifting up the parietes, the stomach became still further separated from

them, owing to the readiness with which the stitches came out. The part which had been opened was the middle of the organ, or at the lower part of the anterior surface, and scarcely any adhesion had as yet formed around the incision ; the colon lay immediately below, and was adherent to the under surface of the wound, as also was a portion of omentum which had been curled up into this position. The stomach, on being opened, contained food, and the mucous membrane was healthy, except being of a dark colour around the opening. The small intestines contained food, and the large intestine fecal matter.

We have reported somewhat in detail this case, and the post-mortem examination, to give our readers a comprehensive view of all the circumstances which again induced us to resort to this formidable operation, one which in the minds of some may be considered unwarrantable, and now we will make a few comments upon its peculiarities. The physician may find himself powerless in an inflammation of a vital organ, and he is aware that there may be many attendant and unseen circumstances tending to a fatal result, but it is at all times particularly painful to the surgeon to see a patient dying from disease of an organ which is not absolutely necessary to life. Our habits, as surgeons, of viewing diseases and their results induce us to believe that our art is capable of affording relief in many instances of disease, and therefore it is not remarkable that a simple obstruction of a tube like the cesophagus, which is causing death by starvation, did present to us a case that demanded extraordinary remedial measures, and induced us again to perform the operation of gastrotomy. The little patient, the subject of these remarks, was gradually dying out before our eyes, not from acute inflammation nor organic disease of any vital part, but simply from the result of a powerful escharotic, applied to a tube which was the tramway by which food was conveyed to an organ essential to life, and which tube was becoming obstructed. The contraction consequent upon the injury induced by this escharotic was going on gradually and surely, and it appeared that could we by any means relieve that tube of its constant irritation, and give it a few days' or weeks' rest, it might so far recover itself as to admit of the contracted parts being dilated by mechanical means, as in

ordinary stricture of the urethra ; or failing this, it appeared that we might by an operation lessen the horrors of a death from starvation. The constant exhibition of enemata of a nourishing kind seemed to promise at first some prospect of obtaining these ends, but the injection failed to afford sufficient nutriment, and we can easily understand that in a child a supply from such a source was not likely to be of any permanent service. What, then, was to be done? We suggested, on the 5th of February, that the operation of gastrotomy should be performed, but the fact of the little patient swallowing the greater part of a cup of milk on that day seemed to indicate to my colleague the propriety of still further postponement.

With respect to his ability for swallowing, the boy would take sometimes as much as a table-spoonful, or even two, in his throat, but there was no rising of the larynx as in the usual act of deglutition ; it would be occasionally ten minutes or more before such effort of swallowing took place, and then only to a slight extent. This was easily explained at the post-mortem inspection by the dilatation of the lower part of the pharynx, as was suspected during life, and thus we suppose that the large quantity taken into the mouth must have filled this pouch or dilated part of the œsophagus, and that a portion of the fluid slowly drained through the constricted part, and then a sudden effort was made to swallow what remained. Sometimes, however, the whole would be returned after remaining in this point at least five minutes, without any effort of vomiting.

It seemed at the time that we have mentioned, viz., the 5th of February, that the boy gradually began to decline, and we more than once suggested the propriety of performing the only operation that appeared to offer a prospect of saving the little fellow's life ; for to attempt to pass a tube down the œsophagus of so young a child, and feed him in that way, was quite out of the question without the influence of chloroform ; and when under that influence and deprived of sensibility, it was impossible to say what mischief might have been produced. Moreover, to have placed this patient under an anæsthetic three times a day, in order to feed him, was scarcely practicable. At last, under the most adverse circumstances in which any patient could possibly be found, without having had food for two days, and the child apparently dying, rather than let the last chance pass away, we

performed the operation of gastrotomy, and only regret it was not done much earlier, as we have still full confidence in the operation being yet successful in saving the life of some one who may be placed under circumstances requiring its performance, either for a temporary or permanent benefit, such as it appears to us was the condition of this little patient. The operation in this case was attended with much greater difficulty than the one described in the last number of the 'Guy's Reports,' in consequence, first, of the vascularity of all the tissues; secondly, from the protrusion of the intestines, distended with flatus, directly the abdomen was opened; and thirdly, from the small size of the stomach, which was hidden beneath the intestines, and not reached with nearly the same facility as in the first case of the adult.

This patient progressed most favorably until the morning of the fourth day, when, after feeding by the nurse, peritonitis of a fatal character supervened suddenly, and he died from the first shock of the inflammation. We cannot doubt, looking at the circumstances under which his death occurred, that an unfortunate accident was the cause of the sudden collapse and dissolution; for it will be noticed in the report of the post-mortem that the peritonitis was of a most recent character, justifying our assertion, that perhaps a little extra force employed in introducing the tube at the critical period of the fourth day, when the adhesions of the stomach to the parietes were necessarily very slight, was the immediate cause of the occurrence of the peritonitis. It is a question, therefore, whether we should not be induced another time to keep a tube constantly in the stomach for a week or ten days, and to justify this it may be remarked, that physiologists in the habit of operating on the lower animals constantly do so, and, they affirm, with the most satisfactory results.

Weighing fairly all the circumstances connected with this case, and had we a child of our own in the same condition, we have no hesitation in saying that we would perform the operation of gastrotomy, fatal though it has been in our hands in two cases. We believe it to be perfectly justifiable, if only that it adds comfort to the remaining short period of life reserved for the patient, independently of the probability of cure with a permanent fistulous opening. All the old arguments,



moreover, in respect to the painful nature of the operation, are powerless since the introduction of chloroform. It may, however, be a fair question to ask whether, under any circumstances, an operation of this description may prolong life? We think it did in this case, as well as in the last, and thus are firmly convinced that the patients experienced unquestionable relief from its performance. It is our conviction that under the circumstances anything was warrantable, especially as we know that children recover from almost any operation; therefore we only regret that we had not earlier the opportunity of opening the stomach of this little boy.

PLATE.

Showing the place of incision in case of Gastrotomy.



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THE  
INJURIES AND DISEASES  
OF THE  
NERVOUS SYSTEM.

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BY THOMAS BRYANT.

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THE illustration of disease and of the results of injuries by the quotation of cases has always been a favorite method of imparting knowledge, and the careful study of these examples is a method equally valuable as a means of acquiring it; for by giving the material from which facts and principles are deduced, the author and his readers are placed upon a par, and the latter are enabled to verify the truth of the former's opinions.

With that view, it is my intention, in a series of papers, to illustrate the surgery of the different regions of the body, to give cases and facts deduced from them to support any opinion I may express, and thus to make my readers thoroughly able to understand the principles which have guided the surgeons of a large metropolitan hospital in their practice, and to show that this practice is based upon scientific and pathological inquiries.

These papers will be published in different parts, and the present (Part I) will include the injuries to the skull and spine, with their contents, briefly noticing also some of the diseases. The cases quoted have all been under personal observation, and have taken place within the last five years, in

my own practice and that of my colleagues. They are taken from my own notes, although to my colleague, Dr. Wilks, I have been indebted for many of the particulars of the post-mortem appearances.

It will be quite impossible to illustrate every point which the surgery of the different regions may present; but I trust that nothing which is practical will be omitted, and that the pathology of the diseases and injuries will be so represented as to indicate the basis of a scientific practice.

It will be my aim to illustrate the principal injuries which may take place, to give examples of each form, and to point out the symptoms by which each may be distinguished; to indicate by cases the complications which are generally found, and the pathological conditions and symptoms with which these complications are connected; and, lastly, the principles of treatment will receive attention, and the practice which should be employed in the various conditions illustrated by the quotation of examples.

Where numbers are of value in the support of any line of practice or any pathological fact, they will be given, and the whole source from which this material is drawn will be found tabulated in an ensuing page.

The brief consideration of scalp wounds will first claim our attention, and then we shall proceed to the more serious subject of concussion of the brain, fracture of the skull, and encephalic injuries.



the hæmorrhagic tendency was associated with the injury. After a small scalp-wound, received four days before his admission, constant bleeding had taken place. All pressure by pads, &c., had failed, and the only successful remedy was the application of a styptic in the form of the perchloride of iron; iron was also given internally, and a good recovery ensued.

This patient had always experienced the same hæmorrhagic tendency after the receipt of any wound, and he had also a sister with the same disposition.

From the preceding analysis it would appear that scalp-wounds, as a rule, have a tendency to do well; that the complication of erysipelas, which has been regarded as a frequent one, is by no means so; and that when it takes place it has not a very injurious tendency.

That exfoliation of bone may occasionally follow an injury to the scalp; and that the *treatment* of scalp-wounds should be as simple as possible.

When the wound is a small one, and the edges gape to any extent, the application of a small strip of adhesive plaster, just sufficient to bring the edges of the wound together, is the best treatment, and a soft pad of lint subsequently applied, so as to afford gentle pressure.

When the edges are fairly in apposition, a simple pad is all that is necessary, or perhaps only a piece of wet lint.

But when the wound is an extensive one, and the scalp is separated from the bones beneath, sutures must be applied, the wound having been previously thoroughly cleansed from all foreign bodies, and the edges well adapted.

Strapping between the sutures may be required to maintain the edges together, but the wound should not be covered in by any plaster; a pad of lint may then be adjusted, but if the soft parts are much injured, a simple layer of lint or linen kept moist is to be preferred.

Under this treatment the wounds generally do well. The patient should be kept at rest as much as possible, especially if the wound be very extensive; an occasional purgative may be required, and moderate diet allowed.

## CHAPTER I.

## CONCUSSION OF THE BRAIN.

Any uneducated person, upon handling a skull and examining closely its interior, would be struck with the strange irregularity of its base, and with its numerous prominent and projecting processes. If he were then to examine and handle the brain itself, and to see of what soft and easily lacerable material this important organ was composed, he would not be surprised that any sudden shake or jar, any blow or injury, however slight, would, as a necessary consequence, be followed by some interference with the delicate functions of this most delicate of structures, if it did not produce some mechanical injury to the brain itself.

Anatomists and surgeons are well aware with what care nature has protected the nervous ganglia, how carefully the brain is guarded from external injury, and how beautifully it is suspended, or rather floated, upon its "water-bed." Numerous indeed are the other points which might be indicated, denoting the same forethought, and all directed to the same end; and although this end is generally attained, and the brain is, as a rule, so well guarded that it requires some considerable force to injure it from without, and an equivalent to produce an injury from within, still the practical surgeon is too frequently called upon to witness cases where the functions of the brain are, for a time, considerably interfered with, if not arrested, and where, from mechanical force applied externally, the centres themselves are more or less injured.

The subject of concussion will first claim our attention, and will be discussed in the following chapter.

Concussion of the brain may be considered under different heads, a division of the subject being necessary, as the same injury may be followed by different results.

In some cases an interruption only to the functions of the brain may be produced, although this interruption may be for a short or long duration; in some instances the functions of the brain will be totally suspended, and this suspension will vary in different cases.



At times a fatal termination will take place, and some mechanical injury to the nervous centres themselves will then generally be found.

I propose, therefore, to consider the subject of concussion of the brain under two heads :

1st. *The simple form*, where an interruption only of the functions of the organ follows the injury.

2d. *The complicated form*, where the brain itself is injured, and associated with extravasation of blood, either upon or within its structure.

### SECTION I.

Under the heading of "simple concussion" of the brain I include those cases only which are characterised by some temporary interruption or suspension of its functions, and which, by rest and the lapse of variable periods of time, are restored to their natural condition.

I have fifty-six examples of this description, in eight of which a scalp-wound existed ; in all, the functions of the brain were more or less suspended, as indicated by loss of consciousness and the power of motion ; by rest, the application of cold to the head, warmth to the feet, and, in some few instances, the administration of a mild purgative, perfect recovery ensued.

In many instances, however, the case is more complicated ; the accident is immediately followed by some complication, such as hæmorrhage from the nose or ears, or, more remotely, by signs of increased action or inflammation of the cerebral membranes ; and from my notes of twenty-six examples of this description I propose to extract such cases as will illustrate the subject, giving them as briefly as will be consistent with clearness, and as may be sufficient for the purpose intended.

In the simplest form of concussion of the brain a patient receives a blow or injury which produces some severe shaking of the cranial contents, and this shaking is followed by a loss of consciousness more or less perfect, and also a loss of all power of motion. If the patient is seen at this time, the skin will be cold, and the features more or less contracted, the pulse will be slow and intermittent, the pupils very variable,

in some cases dilated, in others contracted, and, in a third class, one will be dilated and the other contracted.

If the patient is watched, and the case is not one of great severity, after a variable period there will be signs of movement; he will perhaps move a limb, in an impatient and objectless manner; if he is spoken to with a loud voice, he will perhaps show some evident signs of returning consciousness, either by making some inarticulate noise, or by merely opening his eyes, and again returning to his stolid condition.

If the case is still carefully observed, the mode of respiration may become altered; from being slow and labouring, it will be irregular, and perhaps sighing.

After a time, other signs of what are termed reaction will make their appearance—the skin will become warmer and more natural, the shrunken and contracted features will return to their former condition, the pulse will be felt more regular and more rapid, and, what is very frequent, vomiting may appear. This symptom is one of value, it generally shows itself upon the first appearance of what is called reaction, and is apparently the first result of a more active circulation through the cerebral centres. If all goes on well, the patient rapidly recovers, and returns to his natural condition, feeling perhaps for a few days somewhat heavy and drowsy, and indisposed for any bodily and much less mental labour.

In this brief sketch of an ordinary and uncomplicated example of concussion of the brain the symptoms are very marked, and are not associated with any complications, either primarily or after the period of reaction has taken place. In the following examples, however, some such occurred, and I shall at present bring forward only specimens of the primary.

The first examples will be those where the accident was followed by hæmorrhage from the nose, ears, or into the eyelids.

#### CASE I.—EPISTAXIS AND HÆMORRHAGE INTO EYELIDS.

E. P—, a boy, æt. 13, fell off a ladder twenty-five feet, the fall rendering him perfectly unconscious and motionless. He was admitted shortly afterwards in this condition, with *ecchymosis into the lids of both eyes*, and also with *epistaxis* from the right nostril; in about eight hours reaction appeared,

*with vomiting*, consciousness then returned, and he rapidly convalesced.

CASE II.—HÆMORRHAGE FROM THE EAR, AND EXCESS OF REACTION.

A man, æt. 38, having been thrown from his cart upon his head, was admitted in a partially unconscious and paralytic condition, with a cold skin and labouring pulse, and also with *profuse hæmorrhage* from the left ear. It commenced immediately after the injury, and continued for about three hours. Reaction rapidly appeared, and upon the fourth day the man complained of intense pain shooting through his head and general drowsiness; there were symptoms of feverish excitement and a very anxious expression. A blister was applied to the neck, and one grain of calomel given every four hours; upon the third day all pain had ceased, fever had subsided, and a natural expression had returned; and after two weeks he left well, with the hearing perfectly sound.

The two cases just quoted are not uncommon examples of concussion, as hæmorrhage from the nose and ears are frequent associates of such an injury; but in all such instances the hæmorrhage will be limited. When the nose is the outlet through which blood escapes, the bleeding, as a rule, appears directly after the receipt of the injury, and soon ceases; when the ear is the source of bleeding, it may continue for some few hours and then subside, but it is never followed by the clear serous discharge which is found in cases of fractured bone. It is true that some thin semipurulent discharge may follow upon a discharge of blood, but this probably takes place merely from the coagulation of some blood within the external auditory passage, and its subsequent softening down.

When hæmorrhage takes place into the eyelids, it may be the result of a direct blow, but it is frequently produced by the concussion; the blood, however, will be confined to the eyelids, and will not appear as a subconjunctival ecchymosis, as is seen in fracture of the base through the orbital plates.

We will now pass on, and quote some few cases illustrating the condition of cerebral disturbance which follows upon the accident. In the simplest examples, as previously stated, the

patient, after the receipt of the injury, becomes either totally or partially unconscious, and, after a variable period, gradually or rapidly regains his natural condition ; but in the instances I am about to quote, after a partial return of consciousness, there was a relapse, and the patient returned to his insensible condition. This condition will be denominated a "relapsing unconsciousness," as adequately expressing the exact condition of affairs. It is not a dangerous condition, nor does it appear to indicate any definite complication, but it is a point worthy of observation, as it might lead the surgeon to believe in the existence of some more serious encephalic injury.

CASE III.—CONCUSSION OF THE BRAIN ; RELAPSING  
UNCONSCIOUSNESS.

A boy, æt. 9, when sliding, fell upon his face and struck his forehead with some force ; the accident was followed by complete insensibility and inability to move ; he remained in this condition for about fifteen minutes, and when brought to the hospital was partially sensible, and could answer questions, complaining of pain over the injured front. He was put to bed, and *gradually became perfectly insensible*, and his extremities, when lifted, fell powerless ; in this condition he remained for an hour, and then showed symptoms of returning consciousness ; he vomited severely, bringing up some blood, which had evidently been swallowed ; a mercurial purge was given, and cold applied to the head ; he remained heavy and drowsy for two days, when roused immediately returning to his sleepy condition, but left the hospital in ten days, cured.

Cases like the preceding are not uncommon, although perhaps they are not so well marked ; the relapsing unconsciousness would appear to be produced by the earliest effects of reaction, the vessels yielding too freely to the heart's action, and thus producing a plethora of the part, which induces a comatose or semi-comatose condition. The following case would tend to prove the correctness of this opinion.

**CASE IV.—CONCUSSION ; RELAPSING UNCONSCIOUSNESS ;  
EPISTAXIS.**

A boy, æt. 11, having received a blow upon the head from a falling piece of timber, became perfectly unconscious and quiescent; he remained in this state for fifteen minutes, and recovering, he walked home some short distance. He soon began to feel sick, and vomited, this vomiting being attended with *epistaxis*. He was then brought to the hospital, *with a cold skin and labouring pulse; he was very slightly conscious, refusing to answer any questions, and his limbs remained in the position in which they were placed. The pupils were dilated, but active.* He was left in bed, with the head raised, and cold lotion applied to it, and warmth to the feet, and he gradually recovered, leaving the hospital well ten days after admission.

Having given the complications which are frequently seen in cases of concussion of a simple character—that is, where no lesion of the brain has taken place—I will now proceed to discuss the subject of reaction, and to consider the symptoms and complications which may be found in such a condition.

In the case last quoted it appears probable that a return to a semi-unconscious condition may be produced by a simple reaction, and that epistaxis may also be a symptom of the same process. Vomiting has also been mentioned as an early accompaniment of the restoration of the circulation through the brain, and many cases might be quoted to illustrate the connexion. The following, however, will suffice.

**CASE V.—CONCUSSION OF BRAIN ; REACTION, WITH VOMITING.**

A boy, æt. 16, fell off a railway tender upon his head; he was picked up perfectly insensible and paralysed, and brought to Guy's. When admitted he was quite unconscious, and unable to move his limbs; the skin was cold, pulse slow, respiration laboured, and pupils irregular but active; in about an hour reaction showed its earliest symptoms by some mobility and vomiting, the skin also becoming warmer; from this moment he rapidly recovered.

The next complication which may be found associated with and produced by the process of reaction, after simple and uncomplicated concussion, is *convulsions*, and is well illustrated in the following cases.

**CASE VI.—CONCUSSION ; REACTION, WITH VOMITING AND CONVULSIONS.**

A boy, æt. 15, having fallen from a height of fifteen feet backwards upon his head, was picked up perfectly insensible and paralysed; he was immediately brought to Guy's in this condition, and placed in bed. In about half an hour reaction appeared, accompanied with vomiting and convulsions, he then became partially sensible; for twenty-four hours afterwards he remained in a drowsy and confused condition, with dilated but active pupils, a quick pulse, and he vomited at intervals. A mercurial purge was given, and cold applications employed to the head, and a steady recovery ensued, without any bad symptom.

**CASE VII.—CONCUSSION ; REACTION AND CONVULSIONS.**

A boy, æt. 9, having fallen from the height of twelve feet upon his head, was rendered completely insensible. He was admitted in this condition three hours after the accident; in a few hours he became violently convulsed (as an epileptic), and remained so for one hour and a half. His breathing became stertorous, and he vomited; he then fell into a deep sleep, and awoke sensible; the head was shaved, and four grains of calomel administered. The following day he was drowsy, although sensible; the pupils were active but irregular; pulse hard, and 84. Two grains of gray powder and three of Dover's powder were given twice a day. Upon the next day, the third after the accident, he became perfectly natural; he was kept quiet, and the mercurial was continued with the best effects, the boy leaving the hospital cured fourteen days after his admission.

The two cases just given are sufficient to prove the connexion between reaction and convulsions; the latter could

hardly have been produced by any inflammatory or other cerebral injury, as other symptoms would have accompanied it, and the steady and rapid convalescence of both patients forbids the idea of any such complication.

I shall now pass on to consider other complications, and to illustrate them by an example of each kind. Some pain in the head after concussion is generally present, but in some instances it is of a very severe character.

CASE VIII. — RELAPSING UNCONSCIOUSNESS ; REACTION,  
ATTENDED WITH ACUTE PAIN IN THE HEAD.

A boy, æt. 15, fell off a scaffold upon his head, a distance of twelve feet ; he was taken up quite unconscious, and unable to move, and admitted into Guy's in such a condition. After a few hours' rest in bed he began to show signs of animation, but speedily relapsed. In about twelve hours he became sensible, and complained of *most intense pain through his head* ; this was shaved, and cold lotions applied, a purgative was also administered ; in another twelve hours this pain had left him, and he rapidly convalesced.

The next complication is of simple delirium occurring when reaction was established, and then rapidly subsiding. It can be illustrated by the following case.

CASE IX. — CONCUSSION, REACTION, AND DELIRIUM.

A man, æt. 35, who received a blow upon the head, causing a scalp-wound and partial insensibility, was admitted into the hospital with cold skin, labouring pulse, and slow breathing ; he soon, however, became perfectly conscious, but also *delirious*. His skin became hot and pulse quick. The gray powder and Dover's powder were given three times a day in three-grain doses, and after twenty-four hours all bad symptoms had disappeared ; recovery was retarded by an attack of erysipelas, but he left the hospital cured in six weeks.

Having thus illustrated the subject of concussion by simple

cases, and others associated both during their primary stage and also during the stage of reaction with certain complications, we pass on to the consideration of others, in which the stage of reaction has been somewhat excessive, and has been accompanied by complications of a different character, being evidently produced by some inflammatory action.

In Case II, already quoted, reaction had been evidently in excess, producing symptoms of some slight inflammatory action; treatment, however, fortunately proved of value, and checked its course.

In the following example a slight concussion of the brain was followed by inflammatory symptoms, causing squinting, which, however, was cured by treatment.

#### CASE X.—CONCUSSION; STRABISMUS.

A man, æt. 26, having been struck down by a bag of sugar falling from a height upon his shoulders was rendered almost completely unconscious; within a few minutes consciousness partially returned, and he vomited freely. In this condition he was admitted into Guy's Hospital, being drowsy and roused with difficulty; in a few hours he became quite sensible, and complained of pain in the head; he was kept in bed, and cold lotions were applied to the seat of pain, and a mercurial purge administered. The pain, however, continued very intense, associated with a hot skin and contracted pupils, and upon the fourth day a *convergent squint* of the right eye was very marked. Gray powder and Dover's powder, in three-grain doses, were given three times a day, and in three days all these symptoms were much diminished, the fever was less, pupils less contracted, and the eyes were more tolerant of light; the strabismus also was improved. In another three days the squint, with all bad symptoms, had disappeared, and after a few weeks' residence in the hospital he left cured.

This secondary inflammatory action may, however, be more acute, and give rise to all the symptoms which an inflammation of the cerebral membranes is wont to produce.



## SECTION II.

## CONCUSSION OF THE BRAIN, COMPLICATED WITH SOME LESION OF ITS STRUCTURE OR EXTRAVASATION OF BLOOD.

Although there may be some difference of opinion amongst physiologists as to the question whether an alteration in the functions of a part necessarily involves any change of its structure, I think there can be none amongst surgeons or pathologists as to the fact, that in all cases of injury to the nervous centres, producing a suspension or alterations of their normal action, there is and must be some change or injury to the structure of the brain or spinal cord, although that change may be overlooked by the naked eye.

When we consider the delicacy of the structure of the nervous ganglia, and how little we even now know of the distribution of its fibres, or of their anatomical arrangement, it is not to be wondered at that the acutest pathological eye may at times be baffled in discovering any abnormal change, when the normal is not yet understood.

As the science of pathology advances, and the eye of the student learns how to observe, and what to look for, alterations of structure are observed which our ancestors never dreamt of, and which consequently would have been passed over. In cases of death from concussion of the brain there can be no doubt this mistake has often been made, and the cases are not rare, as described by authors, where death followed upon concussion of the brain, but no lesion of its structure had been detected.

I am not disposed to dispute the value of their observations, or to doubt the truthfulness of their descriptions, but I do believe that such cases are of exceeding rarity, if they occur at all; and that some change in the brain itself, or upon its surface, will generally be found if earnestly looked for. There will be some extravasation of blood, either upon its surface or within it; if upon its surface, it will be either upon or within the membranes, or within the meshes of the pia mater; and if the latter, some ecchymosis of the cerebral convolutions will generally be present. If the extravasation of blood takes

place within the structure of the brain, the clot will seldom be—as in an apoplexy—in one large mass, but it will generally show itself in small and numerous patches, varying from a pin's head to a pea in size.

I will now proceed to quote briefly some illustrations of these points, and will commence by quoting an example of concussion followed by ecchymosis of the brain.

**CASE XI.—CONCUSSION AND ECCHYMOSES OF THE BRAIN, BOTH UPON ITS SURFACE AND WITHIN THE VENTRICLES.**

A girl, *æt.* 4 years, having been knocked down by a pocket of hops falling from a height upon her, was taken up quite insensible, and brought to Guy's. She was admitted perfectly unconscious, in a comatose condition, and with stertorous breathing; this continued without any interval until her death, sixty hours after the injury; there were at the same time frequent twitchings of the limbs and rigidity of the muscles; the pupils also were fully dilated. After death the bones were found to be quite sound, and free from fracture. The brain was bruised all over, especially towards the anterior lobes, and upon its upper surface; and at its base the anterior and middle lobes were likewise ecchymosed. Blood also was extravasated at these injured spots. The fluid in the ventricles was of a pinkish colour, and the parts around were ecchymosed.

The case just quoted is a good illustration of concussion of the brain causing ecchymosis of its structure to a great extent, both externally and within the ventricles. It may, however, be found in all degrees, from the mere local bruise to the almost pulpy condition of the cerebral masses, as indicated by the case just given.

I shall now pass on to give an example of extravasation of blood upon the surface of the brain, accompanied with slight laceration of the brain-structure, as a result of concussion.

**CASE XII.—CONCUSSION; EXTRAVASATION OF BLOOD UPON THE SURFACE OF THE BRAIN, AND ECCHYMOSES.**

A man, *æt.* 31, when drunk, wrestled with a companion,

and was thrown violently against a curbstone upon his head. He was removed to a hospital in an insensible condition, where a scalp-wound, which was produced by the fall, was strapped up, and he was then carried home. The following day his consciousness partially returned, and he had a fit (apparently epileptic); and as this recurred upon the third day, his friends brought him to Guy's. He was admitted under the care of Mr. Cock, perfectly insensible, with contracted features, and an anæmic appearance. He had a hot skin and rapid pulse, his pupils were contracted, and there was great restlessness and slight delirium; a lacerated wound also existed over the left occiput. His head was shaved, and cold lotion was applied to it, a mercurial purge being ordered. Upon the next day, or upon the fourth after the accident, a severe epileptic fit took place, and returned every five or six hours till the evening of the fifth, the left side of the body being the most affected. During the intervals a semi-comatose condition existed, and the skin was bathed with perspiration; he could, however, be roused with difficulty, and answered questions quite rationally; the pupils were obedient to light.

Upon the seventh day he was much improved, and appeared more sensible. Upon the eighth day symptoms of delirium tremens showed themselves. Opium was freely given, but failed to produce sleep till the tenth day, after thirteen grains had been taken; he then slept twelve hours, and upon waking was more rational, and was evidently relieved. Opium was continued at intervals, and he appeared to improve gradually until the twentieth day, when he became very drowsy, and this passed on to a semi-comatose condition. He could, however, be roused, and answered questions. He remained in this condition, at times uttering a shrill sudden scream, and then relapsing into quietude. His pupils became contracted, and his fæces and urine passed involuntarily. In this condition he remained for seven days, being more or less restless; he then became quite sensible, and at the expiration of three hours died quietly.

His body was examined forty-six hours after death.

Upon the occiput there was a dry scabby wound, about the size of a crown.

Upon removing the scalp, several ecchymosed spots were

observed over the posterior part of the left parietal bone, but no injury to the bone could be detected. When the calvaria was removed, the dura mater upon the right side was baggy, quite clear and healthy. On dividing it, and exposing the whole surface of the brain, a layer of blood was found to be universally diffused over it, this layer being less upon the left side, and there principally in the meshes of the pia mater, and between the convolutions ; but upon the right side there was a clot almost an inch thick, especially over the anterior and lateral lobes, passing downwards towards the base. The clot was shreddy, of a dull reddish black colour, and had evidently been effused for some days. On the posterior part of the left hemisphere a small portion of the convolutions was softened, of a red colour, and with an adherent clot ; a similar state was also found upon the anterior lobe of the right side, evidently the result of *contre-coup*.

None of the sinuses or large vessels could be found injured. They all appeared healthy, as also were the minute capillaries.

The brain was firm, but congested, and the other viscera quite healthy.

In this case there was no doubt about the character of the accident, and there also was none as to the cause of death, extravasation of blood upon the brain and laceration of its structure having taken place as a result of pure concussion. The vessels were also found, after a careful examination, to be quite free from disease, forbidding the idea of an apoplexy having taken place.

If this had not been the case, and considerable disease of the cerebral arteries had been detected, such a doubt would naturally have arisen ; and it is in such cases of extravasation of blood within or upon the brain, associated with an injury, that much difficulty is often experienced by medical jurists. It is true that where the vessels of the brain are diseased, a rupture of their coats, and, as a consequence, an apoplexy, is more likely to result from a slight injury than where those vessels are sound ; and the following case is a good example of such an occurrence.

**CASE XIII.—CONCUSSION ; DISEASED VESSELS ; EXTRAVASATION OF BLOOD INTO BRAIN.**

A man, set. 56, when descending a ladder, fell from a height of thirty feet, striking his head in the descent against a projecting wall. He was taken up quite insensible, and in this condition was admitted one hour after the accident under the care of Mr. Hilton. He was perfectly unconscious, with a slow, labouring pulse, stertorous respiration, and contracted pupils; the eyes rotated constantly in their orbits, and an abrasion existed on the left ear.

The following day, when addressed sharply, he partially opened his eyes. His pulse was rapid, and his urine flowed involuntarily from him. The second day his skin became hot, pulse more rapid, and peculiar spasmodic attacks of difficulty of breathing appeared, accompanied with some movements of his limbs. A few ounces of blood were taken from his left external jugular vein, reducing the pulse; but the patient rapidly sunk.

Forty-five hours after death the cranial bones were seen to be full of blood, but not fractured. The dura mater was found congested, with a thin layer of bloody serum beneath; the arachnoid was thickened and opaque; the pia mater infiltrated with semi-coagulated fibrin, easily separated from the convolutions. At the base of the brain the arteries were in shape, and quite rigid from disease, and in the substance of the hemispheres *were several points of extravasated blood, about the size of peas.*

The heart was hypertrophied, and the left valves thickened. The kidneys were coarse and granular.

There would be no difficulty in quoting other cases where doubts would be experienced in forming an opinion as to the cause of death. In this case, did the man fall as a consequence of an apoplexy? or was the extravasation of blood the result of the fall?

It is difficult to express an opinion upon such a point; but as it is not common for an apoplexy to take place from many vessels at the same time, and as in this instance such was the

condition, and as we fairly expect that a violent shaking of the head, or concussion, in a man the subject of extensive arterial disease, would be likely to produce rupture of the diseased vessels, and as a consequence multiple apoplexies, I am disposed to give my assent to the latter query.

Authors have described the occurrence of extravasation of blood external to the dura mater, between it and the bone, as a result of concussion of the brain. There may be some doubt as to the occurrence of such instances; at any rate, they are very rare. I have no notes of such a case, and will not therefore quote an example. The extravasation is said to be produced by rupture of one of the meningeal arteries, and there are no symptoms by which such an accident can be distinguished, that is to say, there are none which will enable the surgeon to diagnose the exact seat of the extravasation, whether it is within or without the membranes. To make out the fact that extravasation has taken place is not generally a task of difficulty.

As a rule, however, I am disposed to believe that in cases of rupture of a meningeal artery some fissure or fracture of the skull will be detected upon a careful examination—it may be only a fissure at the point of injury, but a fissure will be found. It is difficult to understand how a rupture of a meningeal artery running in a bone could take place without a fracture, but the authorities upon which such instances are given forbid any direct contradiction to the fact.

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## CHAPTER II.

### FRACTURES OF THE CRANIUM.

The fact that fractures of the skull are in themselves of small consequence, as long as the cranial contents are uninjured or uninvolved, is now so well understood, that it needs no comments in these pages.

But it is seldom that such uncomplicated cases are seen in practice; the bones of the skull are of a firm and compact

structure, and any injury to them sufficient to produce fracture will, as a rule, cause what has been described as concussion of the brain. This complication is the simplest that can take place. It is true that that concussion may be associated with other complications, such as have been already described—as hæmorrhage upon the brain, or within its structure; laceration or bruising of the cerebral masses; and, as a secondary complication, arachnitis, or inflammation of the brain itself. But besides these there are other complications which are more frequently associated with or are peculiar to fractures of the skull, such as depression of bone, producing compression of the brain; extravasation of blood external to the dura mater, from rupture of the meningeal artery; injury to the membranes, or injury to the brain.

The subject of fractures of the cranium may consequently be divided into several classes, each of which is worthy of a separate consideration.

- A. Fractures of the skull unassociated with any encephalic complication.
  - B. Fractures complicated with simple concussion.
  - C. Fractures associated with extravasation of blood external to the dura mater.
  - D. Fractures complicated with extravasation of blood upon the surface of the brain.
  - E. Fractures associated with extravasation of blood within the cerebral structure.
  - F. Fractures complicated with depression of bone.
  - G. Fractures complicated with direct injury to the brain-structure.
  - H. Fractures of the base of the skull.
- A. *Fractures of the skull unassociated with encephalic complications* are no doubt of great rarity, for it is difficult to understand how a force can be applied sufficient to produce a fracture of the cranium without at the same time causing some concussion of the brain; this concussion may be very slight, and may be known

perhaps by only a slight confusion, thus escaping the observation of the surgeon, who sees the case generally after the lapse of some short period of time. Cases are not unfrequent where a fracture of the skull has been overlooked, the local contusion and the severe symptoms of concussion for a time masking the injury, the fracture being subsequently discovered when the swelling has subsided. Practically, however, this is not of very great importance, as it is not the mere fracture of the skull which causes danger, but the injury to the cranial contents.

An interesting case of incised wound of the skull may here be quoted, unassociated with any cerebral disturbance. It is as follows.

**CASE XIV.—INCISED WOUND OF SKULL, INVOLVING ONLY THE EXTERNAL TABLE.**

A labouring man, *æt.* 27, received a blow over the vertex from a broken sword; an extensive scalp-wound was the result, and a very evident incised wound in the upper portion of the frontal bone apparently involving only the external table, and uncomplicated with the slightest cerebral disturbance. The edges of the scalp-wound were brought together, and a steady convalescence ensued, without a bad symptom.

Fracture of the skull may take place over the frontal region; and involving the frontal sinuses, the primary effects of the injury may be chiefly manifested there, although the fissures may radiate more extensively; in these cases the brain itself may be uninjured and no cerebral disturbance take place. The following case is a good example of such an injury.

**CASE XV.—FRACTURE OF THE SKULL, INVOLVING THE FRONTAL SINUSES; NO CEREBRAL SYMPTOMS.**

A boy, *æt.* 6, having been knocked down by a horse and trampled upon, was admitted into Guy's Hospital, under the care of Mr. Birkett, with severe ecchymosis and swelling of the whole forehead, and an extensive scalp-wound and compound fractured



skull over the frontal region. The finger could be freely introduced into the wound and depressed bone felt; there were, however, no brain-symptoms, and the child was not even stunned by the injury.

Water-dressing was alone applied to the wound, and the child kept in bed. As the swelling subsided a fracture was clearly detected, radiating upwards from the primary seat of injury to the right parietal region. Convalescence steadily followed, and the boy left with the wound nearly healed six weeks after the injury.

- B. The next class of cases which require illustration are much more frequent than the last; it includes all those examples of fractured skull *associated with simple concussion of the brain*; that is to say, where, after the receipt of the injury, the functions of the brain are for a time more or less interfered with or suspended, but which have a tendency gradually to return to their normal conditions.

CASE XVI.—FRACTURE OF THE SKULL; CONCUSSION;  
SECONDARY INFLAMMATION, AND RECOVERY.

A child, æt. 4, twelve hours prior to her admission, fell out of a window upon her head; she was taken up quite insensible, bleeding from the right ear; vomiting speedily came on, and continued at intervals for some hours; about ten hours after the injury she became sensible, and spoke, asking questions, but as she relapsed into insensibility she was brought to Guy's. Admitted very drowsy, but could be easily roused; pupils natural and acting, skin moist and warm, pulse quick and of moderate power. A cold lotion was applied to the head, and two grains of gray powder ordered to be given every three hours.

For several days she was very restless, and feverish, and upon the fifth day appeared to be quite blind; the pupils were dilated and refused to act. The mercurial was continued, and in another five days the child much improved, and the sight began to return. The child groaned a good deal during the night, but had perfect use of her limbs. After the lapse of

another week the sight appeared to be perfect, all fever had left, and the child's natural manner returned; a fracture was then discovered, passing over the frontal bone towards the squamous portion of the temporal, and the child left the hospital after a month's residence, convalescent.

This case is a good illustration of fracture of the skull complicated with concussion; this was followed by some inflammatory symptoms, apparently involving the optic nerves, causing temporary blindness. The treatment adopted was most successful; as the secondary inflammatory symptoms were subdued, sight returned, and a good recovery ensued.

The fact that a fracture of the skull was subsequently discovered is a point of interest, the severity of the cerebral complications demanding the chief attention, and the effusion which must have taken place in the line of fracture having for a time concealed the injury.

**CASE XVII.—FRACTURED MASTOID PROCESS; LOCAL EMPHYSEMA; SECONDARY FACIAL PARALYSIS, AND RECOVERY.**

A man, *æt.* 45, when at work received a blow behind the left ear from the handle of a crane; the accident was followed by insensibility for fifteen minutes, and when admitted, about half an hour after the injury, he was quite sensible. There was a scalp-wound over the seat of injury, and some local emphysema, passing upwards upon the side of the head, evidently indicating that the mastoid cells were opened; there was no discharge from the ear, or facial paralysis. Simple water-dressing was applied, and after three days the emphysema had disappeared. No bad symptom or anything abnormal showed itself till the ninth day, when he first complained of a noise in the left ear, followed upon the next day by deafness and facial paralysis. A blister was applied to the neck, and a mercurial, in the shape of Hydrarg. c. creta, gr. iv, twice a day. After a week these symptoms began to subside, and in a fortnight the facial paralysis had disappeared, and although he stayed in the hospital another month, he left well in every respect, excepting slight deafness upon the injured side.

In this case of compound fracture of the mastoid process slight concussion was produced by the injury ; those symptoms rapidly subsided, together with the emphysema, which was an interesting complication. Upon the ninth day the deafness and facial paralysis must have been produced by some inflammatory action within the petrous bone, and although the treatment adopted proved of sufficient value to restore the facial nerve to its normal condition, the more delicate structure of the auditory failed to receive equal benefit, and some slight deafness was the result.

*C. Fracture of the skull, associated with extravasation of blood external to the dura mater.*

This form of injury will be best illustrated by the following case.

**CASE XVIII.—FRACTURED SKULL; CONCUSSION; RUPTURED MENINGEAL ARTERY AND HÆMORRHAGE EXTERNAL TO THE DURA MATER; COMA, AND DEATH.**

A man, æt. 49, when riding in a gig, was thrown out upon his head ; the accident produced a scalp-wound over the left side of the vertex, and some insensibility ; this speedily passed away, and he got up and walked for about half an hour. He then became confused and staggered ; he went into a shop, and was supposed by the shopkeeper to be intoxicated, but as he gradually became quite insensible he was brought to Guy's. He was admitted under the care of Mr. Cock, perfectly unconscious and comatose, with dilated pupils, labouring pulse, and slow respiration ; he very soon became convulsed, the right arm being the most so ; this, however, in a few hours became paralysed. He remained in this condition for two days, and died comatose.

After death, upon removing the calvaria, a large clot of blood was seen lying upon the dura mater, proceeding from the middle meningeal artery ; it was about two and a half inches in diameter, and more than one inch in thickness ; it formed a globular tumour, and caused an extensive depression upon the left hemisphere beneath the parietal bone. The surface of the brain was healthy, but the pressure of the clot

had altered its whole shape, the longitudinal fissure being pressed to the right, and presenting a concavity to the injured side.

The skull was fractured in a vertical direction, the fissure passing from the middle of the left parietal bone to the jugular foramen. The bone was thick and spongy, whilst the bone at the base was in spots as thin as a wafer. This was the only injury.

This case scarcely requires any comment; it tells its own tale. A man is thrown out of his gig, and receives a scalp-wound and some concussion of the brain; in a few minutes these symptoms pass away, and he walks about; when reaction has become established the middle meningeal artery, which was torn through by the fall, pours out its blood; the man becomes confused and giddy, as if intoxicated; the effusion continues, pressing gradually upon the brain; at first it acts somewhat as an irritant, causing twitchings and convulsions of the limbs, but soon, however, by its pressure, it paralyses the brain, causing coma and death.

In any case presenting symptoms like the preceding, the diagnosis of extravasation of blood becomes tolerably certain; its exact seat, however, is another point. The fact that the man took two days to die would perhaps indicate pressure from above, as pressure upon the base causes more immediate paralysis of the respiratory nerves, and death therefore becomes more rapid.

If the extravasation had taken place within the arachnoid, the blood would have gravitated downwards to the base, and, as a consequence, would have destroyed more quickly; but, although it is not difficult to form an opinion as to the fact of hæmorrhage taking place, it is almost impossible to diagnose its exact seat, except in quite exceptional cases.

One of those is well represented by the following example.

**CASE XIX.—FRACTURED SKULL OVER THE COURSE OF THE MIDDLE MENINGEAL ARTERY; EXTRAVASATION OF BLOOD EXTERNAL TO THE DURA MATER; OPERATION AND RECOVERY.**

An engineer, æt. 16, when at work, received a severe blow  
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from a piece of wood, projected from a steam lathe, over his left temple. The accident produced total insensibility and an extensive scalp-wound. Admitted six hours after the injury, perfectly unconscious and comatose; the limbs seemed quite useless, and pupils dilated. There was much hæmorrhage also from the wound. Mr. Hilton, under whose care he was admitted, enlarged the wound, and found much blood effused beneath the pericranium, and beneath this were radiating fissures, through which blood oozed; there was also some slight depression. By the elevator three pieces of bone were removed, exposing a clot of blood external to the dura mater; this was taken away, and healthy membrane became visible. After this operation the patient became more sensible, pulse more rapid, and breathing less stertorous. For three days he remained in a very restless condition, taking no nourishment; but after that he gradually recovered, leaving the hospital cured.

In this case the character and position of the injury fairly led the surgeon to suspect a fracture, and with it a laceration of a meningeal artery. The blow was a sharp and sudden one, causing a local injury. The position of the wound was exactly the one where the middle meningeal artery was situated, and thus a fracture on such a site was likely to be associated with its rupture.

The correctness of the opinion was verified by the success of the operation, and the subsequent termination of the case justified both.

**CASE XX. — COMPOUND COMMINUTED FRACTURED SKULL; HÆMORRHAGE, AND ABSENCE OF HEAD-SYMPOMS TILL THE EIGHTH DAY; REMOVAL OF LOOSE BONE AND CLOT, WITH RELIEF TO SYMPTOMS; EXPOSURE OF DURA MATER; SUBSEQUENT EXFOLIATION OF BONE; GRADUAL RECOVERY.**

Jessie N—, æt. 46, was admitted July 25th, 1858, under the care of Mr. Birkett, having a short time previously, when asleep with her head resting upon a pillow, been struck by her husband upon her head with the butt end of a large hatchet.

When admitted, there were three scalp-wounds on the left side of the head, from which it was said much hæmorrhage had taken place—the anterior one situated a little above the left eyebrow, a middle one over the temporal fossa; and a third over the left parietal tuberosity. With the finger the surface of the skull could be touched, and a fracture was discovered. She was in an almost unconscious state, but replied to questions, although in a low tone. The pulse was very feeble, but there were no indications of severe cerebral injury. Perfect rest was enjoined, and the wounds were covered with wet lint. She went on well, and upon the fourth day there were still no indications of cerebral injury, and the only complaint she made was of severe pain in the head. She replied to questions sensibly; the wounds had, however, assumed a sloughing aspect, and were dressed with the addition of a little nitric acid in the water.

Upon the eighth day the first cerebral symptoms made their appearance, the muscles of the upper extremities became convulsed, and the hands clenched, the *left* pupil was also more *dilated* than the right; she seemed light-headed, and did not reply to questions so sensibly as before; the pulse was slow and weak, and her expression was anxious. As these symptoms indicated local pressure of the brain at the seat of injury, Mr. Birkett, at 1 p.m., laid the two wounds into one, exposing the bone, which was seen to be extensively fractured in a radiating manner, and in parts depressed. By gentle manipulation two large pieces of bone were removed; one, the anterior piece, showed a larger surface of the external table and a small portion of the internal, whilst the posterior fragment showed a small portion of the external table, and a large surface of the internal; the internal table of this fragment contained the groove for a branch of the middle meningeal artery, and in one of the grooves the fracture extended.

When the two pieces of bone were removed, a large coagulum of blood was seen, which entirely obscured the dura mater, and when a thin plate of the inner table was gently elevated active arterial hæmorrhage took place, which immediately ceased when it was left alone. Mr. Birkett left this small loose portion of bone *in situ*, to be detached by natural processes. Upon the ninth and tenth days some hæmorrhage

took place, which was arrested by cold, and the removal of the coagulum. She gradually improved, having lost all head-symptoms after the operation; pulse and pupils became natural, and the wound healthy; and upon the eighteenth day the small piece of bone above mentioned was removed, as it was quite loose. Along its posterior border was half the groove for a branch of the middle meningeal artery, and towards its anterior border the whole groove for another arterial branch.

From this time all things went on well. Upon the seventy-fourth day she began to complain of a peculiar hissing sound or noise in the head, which distressed her much; she was still feeble, but gaining power. Subsequently to this several large pieces of bone were removed, and many small pieces, and the wound healed slowly by granulations from the surrounding integuments dipping into the hole in the cranium, and uniting with the surface of the dura mater.

Her general health gradually improved, and the wound healed; and, after eight months' residence in the hospital, she left cured, having lost seven square inches of the lateral cranial walls, or bone extending three and a half inches from before backwards, and two inches from above downwards.

*Remarks.*—This case is an admirable illustration of a severe local injury to the skull, uncomplicated with any general cerebral disturbance. Although the bone was most extensively fractured, and the middle meningeal artery torn through, there was but little injury to the brain itself, as manifested by the absence of all cerebral symptoms. The extensive fracture of the skull allowed the blood from the ruptured vessels to escape externally, and, consequently, early compression of the brain was prevented. Upon the eighth day such symptoms first appeared, the external escape of blood having been probably retarded by the formation of the clot, and the compression of the brain was thus caused. The relief afforded to such symptoms by the removal of the bone was very marked, all such disappearing after the operation.

The wisdom of leaving the small piece of bone involving the artery was well shown, and is an interesting point.

The absence of any subsequent meningeal inflammation was very fortunate, and probably the perfect rest and absence of all cause of excitement tended to prevent it; but more pro-

bably it revealed the fact that the brain itself was uninjured, the force of the blows having been expended upon the seat of injury.

The case is a most valuable one, as demonstrating to what an extent a local injury to the skull may take place, and a good recovery result.

*D. Fractures of the skull complicated with extravasation of blood upon the surface of the brain.*

This division of the fractures of the cranium, complicated with extravasation of blood upon the surface of the brain, is the most important and the most serious.

In the last cases, given to illustrate hæmorrhage external to the dura mater, the injury is generally a local one, produced by a sharp blow, causing fracture and laceration of a meningeal artery, and the brain, as a whole, is uninjured; but in these which we are now about to consider the extravasation of blood is generally only a symptom of a more serious injury, namely, a laceration of the cerebral structure.

The complication is generally found in patients who have fallen from a height, or have received a very powerful blow from a blunt instrument; as a result, the whole brain is powerfully shaken or concussed, and its delicate structure, being forced against some of the many projecting points of bone within the base of the skull, becomes bruised and lacerated, and, as a result, hæmorrhage takes place. This hæmorrhage may be associated with rupture of the meningeal artery and extravasation of blood external to the dura mater, as it may be with laceration and ecchymosis of the interior of the brain; the injury to the brain and seat of the hæmorrhage is generally at the base, and is produced by what is called *contre-coup*.

**CASE XXI.—FRACTURE OF SKULL; EXTRAVASATION OF BLOOD AND CONTUSED BRAIN FROM CONTRE-COUP.**

A man, æt. 46, having been thrown off his horse, was taken



up insensible and with a severe scalp-wound over the left temple. In this condition he was admitted into Guy's Hospital, under the care of Mr. Birkett. No fracture could be detected. He was perfectly unconscious and unable to move, the left pupil was dilated and fixed, respiration labouring, pulse slow, and in this condition he remained till he died, sixty hours after the accident.

*Necropsy.*—After death, when the calvaria was removed, a fissure through the bone was detected at the seat of injury, passing upwards; and, upon removing the brain, it was seen to descend along the middle fossa, through the sphenoid bone, to the carotid canal. Upon removing the dura mater a layer of blood was seen covering the brain, but more upon the right side than the left, and the base was covered. This proceeded evidently from a severe contusion upon the middle lobe of the right side; the brain at this part was pulpy, but at the seat of injury (left side) it was quite uninjured; all other parts of the brain were sound, and the other viscera were healthy.

This case is a good example of injury to the skull, and extravasation of blood as a result of injury to the brain by *contre-coup*. It is this injury to the cerebral structure which is always to be feared in severe falls or blows; and if the part itself, corresponding to the force, is wounded, the opposite or base of the brain is, as a rule, likewise involved. This fact always makes the diagnosis of injuries to the skull a task of difficulty, and the prognosis always unfavorable.

In any injury, however, to the head, which may produce a violent shaking of its contents, extravasation of blood rarely takes place in any part; and where it is associated with fracture, hæmorrhage external to the dura mater is frequently found. Whenever fracture of the skull takes place, some hæmorrhage in the line of injury is generally seen; but it may be to only a very limited extent, and it is only when a trunk of a large vessel has been injured that the brain becomes compressed, and a fatal termination is to be expected from that cause.

**CASE XXII. — FRACTURED SKULL; CONCUSSION OF THE BRAIN; ECCHYMOSES BY CONTRE-COUP; EXTRAVASATION OF BLOOD AT BASE, AND EXTERNAL TO THE DURA MATER.**

A woman, æt. 25, when cleaning windows, fell backwards, from a height of twelve feet, upon her head. She was taken up quite unconscious, bleeding from both nostrils, and immediately admitted into Guy's, under the care of Mr. Hilton. She was insensible, but moaning and restless; pupils were dilated and insensible, and there was some subconjunctival ecchymosis. The pulse was small and irregular, 180; skin cold, but no paralysis; upon examining the right temple, upon firm pressure, there was evidence of fracture. She remained in a very restless condition for twelve hours, refusing to answer questions, but the next day she became more sensible; she complained of pain in her head, and was very restless, and moaned frequently; her breathing was quick, and pulse rapid.

The next day she was so violent that a jacket had to be put on to prevent injury; she passed her urine involuntarily, and became comatose, dying in that condition fifty-nine hours after the accident.

Upon examining the body the skull was found extensively fractured, fissures radiating from the seat of injury downwards towards the base of the skull. Blood was effused external to the dura mater in the middle fossa, particularly towards the base; the middle lobes of the brain were much bruised, and covered with extravasated blood.

In this case we have well illustrated the results which very frequently follow a fall upon the head from some height. The skull is fractured, and the fissures pass downwards to the base, as indicated by the subconjunctival ecchymosis. The accident is followed by a suspension of the functions of the brain; but consciousness returns, and with it reaction, attended with intracranial hæmorrhage; this hæmorrhage causes pressure, and consequently, insensibility, and, after a few hours, coma and death.

The brain, however, does not escape uninjured. The severe jar produced by the fall causes ecchymosis of its structure at the base by *contre-coup*, and with it extravasation of blood, the two sources of hæmorrhage combined proving sufficient to cause a fatal termination.

The following case is also one of secondary hæmorrhage upon the brain. No post-mortem examination was allowed, consequently there may be some doubts upon the case.

CASE XXIII.—FRACTURED SKULL; SECONDARY HÆMORRHAGE;  
DEATH.

A man, having fallen from a height upon his head, was taken up partially insensible, and admitted under the care of Mr. Cock. He was to a certain extent conscious, with a slow respiration, and endeavoured to answer questions. There was no paralysis, but there was some bleeding from both his ears. There was an extensive wound over his right parietal bone, and evident fracture, but no depressed bone; he gradually became quite sensible and spoke freely. He was left at night quite comfortable, but in the morning was found with paralysis of the *left* side, and also of the *right* facial nerve; he was heavy, and roused with difficulty, opening his eyes when spoken to with a loud voice, but he did not speak.

He gradually became more unconscious, and at last comatose, dying sixty-two hours after the injury.

Although the exact condition of parts could not subsequently be demonstrated, the history of the case is one which tolerably clearly tells its own tale.

The man from the fall received a compound fractured skull, and concussion of the brain primarily took place; from this the man partially recovered, and when reaction had fairly set in, and the circulation was freely established, a meningeal artery, which had no doubt been lacerated at the time of injury, poured out its contents, and compression of the brain, coma, and death, followed.

The paralysis of the *left* side and of the *right* facial nerve indicated an extravasation upon the right side (the seat of injury), and also that the extravasation was situated in the

middle fossa, involving the portio dura or seventh nerve; and, indeed, in such cases, the extravasation is almost always towards the lower part of the skull, although there may be some upon the upper surface of the hemisphere; and it is this fact which tells so much against the operation of trephining, the surgeon being unable to reach the most important clot, viz., that at the side and base of the skull, although by the operation he may relieve the pressure upon the upper surface.

*E. Fractures associated with extravasation of blood within the brain-structure.*

When a patient receives any severe injury to the head, sufficient to cause fracture, there can be no difficulty in understanding, from the cases already quoted, that at times blood should be extravasated into the substance of the brain, and the interior of the brain lacerated from the severity of the concussion.

In the following pages cases will be quoted to exemplify such injuries, and they form some of the most serious which come before our notice.

In instances already quoted ecchymosis of the walls of the ventricles has been clearly indicated, and in the following case a more exaggerated example of intracerebral injury will be made known.

**CASE XXIV.—FRACTURED SKULL ; EXTRAVASATION OF BLOOD  
EXTERNAL TO BRAIN AND WITHIN VENTRICLES, WITH  
LACERATION OF CEREBRAL STRUCTURE.**

A man, æt. 52, was found by the side of the Surrey Canal by the police, and believed to be very drunk: he was taken to the station-house, and kept there for two hours; but as his insensibility became gradually worse, and at last perfect, he was brought to Guy's. He was, when admitted, quite unconscious and paralysed; his respiration was stertorous, pulse slow and labouring, and pupils dilated. Upon examining the head, a ridge of fractured and depressed bone was felt over the occiput, beneath an extensive bruise. In one hour he died.

After death, upon examining the body, severe contusions

were seen upon his loins, sacrum, scapula, arm, dorsal aspect of his hand, and also over the occiput, where blood was freely effused.

The skull was found to be extensively fractured in the occipital region; the occipital bone was loosened, and the suture separated; some of the serrated edges were broken off, and the bone could easily be moved upon the parietal. The interstices of the fracture were filled with blood.

Upon removing the calvaria the dura mater was found to be entire, but some blood was extravasated beneath the fracture. The left hemisphere of the brain was covered with blood, and this passed downwards to the base.

The middle lobes of the brain were extensively lacerated and pulped, being covered with extravasated blood. This blood extended inwards into the ventricles, which it filled.

The blood-vessels were healthy; kidneys slightly granular.

The above case is one of great interest, the absence of any history as to the cause of the accident and the extensive amount of injury, alone marking it out for observation.

There was no doubt that the man had received a severe blow upon the occiput, whether by an instrument or simply from a fall may be a question; the numerous ecchymoses upon other parts of the body probably indicated that the former was the cause, and that upon the dorsum of the hand pointed to a scuffle, and a blow to make the sufferer leave go his grasp. The police, of course, were quite innocent in the matter, however much these points were against them.

The early symptoms which led the police to regard the man as intoxicated is of importance, as it appears that the symptoms of commencing and early extravasation often give rise to such an error; and when the surgeon hears such a history, and the patient soon becomes insensible and comatose, internal extravasation, with injury to the surface of the brain, may fairly be suspected.

The diagnosis is of scientific interest, although, practically, little can be done. The surgeon must, in these cases, really fold his hands and watch the succession of symptoms, and with them the too certain death of the victim.

CASE XXV.—FRACTURE OF THE BASE OF THE SKULL; CONCUSSION, AND LACERATION OF THE SEPTUM LUCIDUM, WITH ECCHYMOSES OF THE VENTRICLES; EXTREME EMACIATION, ARACHNITIS, AND DEATH.

A man, æt. 37, when working upon the railway, received a severe blow upon the *right* temporal region from the buffer of an engine. He was taken up quite insensible, and admitted into the hospital with a cold skin, slow pulse, labouring respiration, and contracted pupils; no fracture was detected, but *right* subconjunctival hæmorrhage indicated a fracture at the base; after a few hours reaction set in, with slight delirium. The following day he was quite quiet, and breathed calmly; skin was warm; pulse 85, and full. The second day he became more sensible, answering questions, and paralysis of the *left* facial nerve was observed. Hyd. c. Cret. gr. ij, c. P. Dov. gr. v, were ordered three times a day. He went on without any change till the thirteenth day, being sensible, and asking for what he wanted; no paralysis existed, except in the left face; pupils were natural; skin moist, and pulse regular; but upon the thirteenth day he complained of feeling sick, but not vomiting. His secretions were good, and he took food in moderate quantities, but had emaciated most rapidly. On the fifteenth day, he became slightly delirious at night; on the sixteenth, his urine passed away involuntarily; seventeenth, very restless, and complained of headache; eighteenth, subsultus tendinum, quick respiration; and on the twentieth he gradually sank, quite sensible, and paralysed only in the face.

After death, upon removing the scalp, no fracture was visible. On taking the calvaria off, the dura mater appeared quite healthy, the two layers of the arachnoid were adherent in five places, and the visceral layer was somewhat opaque; the pia mater was congested, and the convolutions of the brain wasted.

The ventricles of the brain contained double the normal amount of fluid, and the floor of the right presented a patch of ecchymosis; the septum lucidum was ecchymosed and lacerated for one inch, laying the two ventricles into one.

The posterior extremity of the cerebral hemisphere was

ecchymosed, particularly at the left side, and the anterior extremity of the right was slightly so, and beneath it the skull was fractured. The base of the skull was extensively fractured; the line extended from the right anterior inferior angle of the parietal downwards towards the frontal, across the orbital plate and posterior portion of the crista galli, through the left orbital plate and interior table of the frontal bone forming the posterior wall of the left frontal sinus. The frontal sinus contained blood, as also did the right orbit.

There was no injury seen to the left ear.

The lungs were partially hepatized, with small pyæmic abscesses. Bronchi filled with tenacious mucus. The other viscera were healthy.

The chief interest of this case is in the form of injury to the brain, the severe concussion produced by the blow upon the side of the head causing laceration of the septum lucidum; the extreme emaciation of the patient is also a point worthy of notice.

The character of the injury, associated with subconjunctival extravasation of blood, most positively indicated fracture of the base in the anterior fossa; and the laceration of the surface of the brain at the point opposite to the injury by *contre-coup* was clearly illustrated.

The diagnosis of the form of injury to the brain was of course obscure, as it too generally is; but pathologically the case is one of some interest, and well illustrates a laceration of the interior of the brain from severe concussion.

#### *F. Fractures of the skull associated with depression of bone.*

We now approach the consideration of a class of cases which are very marked in their character, and much more satisfactory to the surgeon, as in many cases, by the application of his art, he is enabled to confer considerable advantage upon the victim of the accident.

It includes all those cases of fracture of the skull associated with depression of bone, but uncomplicated with any injury to the dura mater or brain beneath. The accident is generally produced by a *sharp* blow, or fall upon some *projecting object*.

It may be followed by symptoms of concussion, which are of a slight character, or with others of compression of the brain; but neither the blow nor fall has been sufficient to cause more than a local injury, the brain itself not having been sufficiently shaken to lacerate or bruise its structure, and, as a consequence, extravasation of blood has not taken place. In some rare examples of compression of the brain from depressed bone no cerebral symptoms are produced; in these instances it is needless to add that the surgeon's art is not required, as by interference he may produce the very complication he seeks to avoid, viz., encephalic injury.

The following cases will illustrate the subject.

**CASE XXVI.—FRACTURE OF THE SKULL; CONCUSSION, AND DEPRESSED BONE; NO SIGNS OF COMPRESSION; RECOVERY.**

A boy, æt. 14, having fallen out of a cart upon his occiput, was at once admitted into the hospital, partially unconscious, with cold skin and other symptoms of slight concussion, and also a distinct fracture of the occipital bone and marked depression of bone about the size of a florin.

In a few minutes he completely recovered his consciousness, and appeared quite natural. No one symptom of compression followed, and he left the hospital, after a short residence, apparently none the worse for the accident.

**CASE XXVII.—COMPOUND FRACTURED SKULL AND DEPRESSION; ONLY SYMPTOM A FEELING OF WEIGHT UPON HEAD, RELIEVED BY REMOVAL OF BONE; RECOVERY.**

A boy, æt. 16, having received a sharp blow upon the head with a piece of iron, was admitted into Guy's, under the care of Mr. Birkett, with a compound fracture of the skull over the anterior superior angle of the left parietal bone, and depression, the bone being somewhat comminuted. There were no symptoms of concussion or compression, and all the boy complained of was the feeling of a great weight upon the head; this symptom disappeared at once upon the removal of the pieces of bone by forceps, and a steady convalescence followed.

The two cases just quoted are admirable illustrations of



simple and compound fracture of the skull, attended with depression, but not sufficient to cause any suspension of the cerebral functions, and also point out the practice which is suitable to each. In the former case no other means than rest and preventive measures were called for; in the latter the careful removal of the loose bone by means of forceps was all that was required.

In the case which I am about to quote the comminuted bone produced some symptoms which were immediately relieved by its removal, and a good recovery took place.

**CASE XXVIII.—COMPOUND FRACTURED SKULL; CONCUSSION, FOLLOWED BY CONSTANT VOMITING AND PAIN IN HEAD, BELIEVED AT ONCE BY REMOVAL OF BONE UPON THE FOURTH DAY; RECOVERY.**

A boy, æt. 9, having fallen off a ladder the distance of four feet upon his head, was rendered partially unconscious; after two hours this state of concussion passed away, and he walked home unattended. His parents examined his head, and found a severe scalp-wound over the left parietal bone. In a few hours he became sick, and vomited his meals; his head also began to ache; these symptoms continuing for *four* days, he came to Guy's.

When admitted, he complained of great pain in the head, more particularly at the seat of injury. There were no other cerebral symptoms; his pupils, pulse, skin, &c., being quite natural. He felt, however, sick, and vomited everything he took.

Upon examining his head there was a scalp-wound over the left parietal bone, and some comminuted depressed bone; this bone was immediately removed by means of forceps, and the headache at once disappeared, vomiting ceased, and he recovered without one bad symptom.

The cases of fractured skull already given associated with depressed bone were unmarked by any symptoms which are generally regarded as indicating pressure upon the cranial contents. The following examples are of another description, and were all complicated with evident symptoms of compressed brain.

**CASE XXIX.—COMPOUND FRACTURED SKULL; DEPRESSED BONE; TREPHINING AND ELEVATION; RAPID RECOVERY.**

A man, æt. 20, received a blow upon the head from a falling crane; he was rendered completely unconscious, and brought to Guy's. When admitted he was partially insensible, but could answer when spoken to. There was no evident paralysis, but his pupils were dilated and fixed, and his respiration laboured; pulse also slow. Upon the head was a large scalp-wound, over the right parietal bone, and with evident depression of bone. As the symptoms did not leave him, Mr. Poland trephined the bone about one hour after the accident and raised the depressed portion. A rapid recovery took place, the symptoms present were immediately relieved by the operation, and fifteen hours after he was perfectly natural; he recovered without one untoward symptom, not even a headache, leaving the hospital six weeks after the injury, quite well.

**CASE XXX.—COMPOUND FRACTURED SKULL AND DEPRESSION; TREPHINING, AND A RAPID RECOVERY.**

A man, æt. 39, when at work received an injury to his head from a brick falling from a height. He was rendered completely unconscious, and brought to Guy's.

When admitted he was very drowsy, although partially conscious; his respiration was slow and labouring; pulse full, but slow; no distinct paralysis was present, and his pupils were dilated.

There was a scalp-wound over the posterior and superior angle of the left parietal bone, and a wedge of bone driven in; it was quite fixed, and could not be removed without the application of the trephine. This was done by Mr. Birkett, and many pieces of broken bone were removed. It was found that the inner table of the skull was extensively fractured, much more so than the outer; the dura mater, however, was uninjured. All bad symptoms rapidly disappeared; upon the eighteenth day erysipelas attacked his head, without, however, causing any ill effects, and in nine weeks after the accident he left convalescent.

**CASE XXXI.—FRACTURED SKULL AND DEPRESSION; COMPRESSION OF THE BRAIN; ELEVATION OF BONE BY MEANS OF THE TREPHINE; RAPID RECOVERY.**

A boy, æt. 12, having fallen from a tree upon the edge of a brick, fractured his skull at the junction of the posterior superior angle of the parietal bone with the occipital. He was taken up insensible, and admitted into Guy's under Mr. Cock. He was quite unconscious, and incapable of moving; pupils were dilated and fixed; pulse and respiration slow and labouring. There was a scalp-wound, and very evident local symptoms of depressed bone, with compression of the brain. Mr. Cock at once applied the trephine, and elevated the depressed bone. The boy soon became conscious, and without any interruption by a bad symptom rapidly convalesced.

From the consideration of the previous cases some valuable conclusions may fairly be drawn.

*First.* That fractures of the skull, although attended with depressed bone, if uncomplicated with any severe concussion of the brain, and therefore with any cerebral injury, and if the dura mater remains uninjured, as a rule, terminate successfully.

*Secondly.* That simple fractures of the skull, associated with depression, if unattended with marked symptoms of compression, are to be left alone.

*Thirdly.* That compound fractures of the skull, attended with depression and comminution of the bones, are to be treated by the removal of the loose portions; and if symptoms of compression exist, and the bones cannot be removed without the use of the trephine, that instrument is to be employed, although with great care, as it would appear that severe injuries to the cranium may recover, as long as the membranes are entire and the cerebral hemispheres are uninjured; but a totally different conclusion will be manifested when we come to consider the next class of cases, where the brain itself has not escaped the injury.

In all the cases of depression of bone the injury has been produced by a sharp blow, the instrument acting locally only

upon the injured cranium; and it is remarkable to what an extent the skull may be fractured, and a recovery take place, if the membranes and brain are not primarily injured, and no subsequent inflammatory mischief supervene. A simple local injury, with severe general concussion, is much more serious than an extensive local one, uncomplicated with concussion or injury to the brain. The dangers of all injuries to the skull depend entirely upon the mischief to the cranial contents, and severe concussion is likely to produce some laceration of the cortical structure of the brain by the *contre-coup*, or some laceration of the more delicate central portions, and, as a result, extravasation of blood is sure to follow, or inflammation of the brain-substance and its membranes. These complications are produced by severe shocks of the brain, from whatever cause: falls from a height, blows from blunt instruments, or any similar injury; and it is from these causes that cerebral injuries are so fatal.

The mere local injury is of comparatively slight consequence, if it is confined to the spot, and the last few cases quoted illustrate the truth of the remark, and in all the injury was caused by a fall upon, or blow with, some sharp instrument.

G. *Fractures complicated with direct injury to the cranial contents.*

In the remarks with which I have concluded the last section of this subject, I asserted that the dangers of all injuries to the skull depend entirely upon the mischief caused to the cranial contents; that extensive intracerebral complications may be produced by slight external injuries; and also that severe external injuries, unassociated with intracerebral mischief, may generally terminate favorably.

In the present section I proceed to show how powerfully nature resents any scratch or injury to the dura mater, and how even any bruise of the brain-structure, and much more how any severe injury to it, is followed by an almost certain death. Any mischief to the cranium itself, uncomplicated with these injuries, may be recovered from; but with them they are most dangerous, and the prognosis is always unfavorable.

**CASE XXXII.—COMPOUND FRACTURED SKULL, WITH DEPRESSED BONE ; ELEVATION ; DURA MATER FOUND INJURED ; ENCYSTED ABSCESS IN THE BRAIN ; DEATH.**

A boy, *æt.* 14, having received a severe blow upon the head from a hammer which a fellow workman was swinging previous to dealing a heavy blow upon a rivet, was admitted half an hour after the accident into Guy's, under the care of Mr. Birkett. He was collapsed and retching violently, but not vomiting. Insensible, with contracted pupils, and a pulse scarcely to be felt. There was some bleeding also from the left ear.

Above the *left* ear there was a wound, and a depressed circle of bone. This was at once raised by an elevator, and the dura mater was seen to have been scratched. After the operation the boy became more sensible ; he passed, however, a very restless night, at times uttering a loud scream, and constantly raising his hand to the seat of injury. These symptoms of arachnitis increased, and upon the fifth day there were spasmodic twitchings of the *right* face and paralysis of the *right* arm ; skin very hot, and pulse rapid and very hard. He was bled to six ounces with decided benefit. The acute inflammatory symptoms partially subsided, and upon the seventh day the skin was cool, and the spasm of the facial muscles was less, and there was some power in the right arm. From this time he steadily improved, all paralysis leaving him, and the wound gradually healing ; he took his food well, and although not disposed to talk, was quite sensible.

Upon the thirtieth day he was seized with pain in the head and vomiting, but after a few days this passed away ; upon the fortieth the pain again returned, and gradually became worse till the forty-fifth ; he then became very drowsy, although he took his food well. He seldom moved, although there was no paralysis ; pupils were quite natural. He again began to improve, and his manner became more natural ; he apparently was daily improving, when upon the seventieth day he became very drowsy and refused food ; skin moist, and pulse quick and feeble ; pupils normal. There was no paralysis. In this condition he remained, apparently merely sinking, and died upon the seventy-fifth day.

*Autopsy.*—On the left side of the head, at the seat of injury, was a recently healed wound, two inches in length, with only a slight exudation from the cicatrix; around the cicatrix the tissues were soft, and somewhat bulged outwards. Upon removing the scalp, this bulging was found to be due to a projection of the brain, or to a hernia cerebri, and therefore, upon cutting it through on a level with the surface of the skull, a considerable portion of brain-structure was removed, contained in its covering of dura mater. These parts were firmly united to the scalp and cicatrix, and were cut out together. They were discoloured, and contained inflammatory products, but were not soft, and nothing like pus was discoverable. It was impossible to say whether the dura mater had been torn or not at this spot, as it was so intimately adherent to the cicatrix that the fact was not ascertainable.

The focus of the injury upon the skull was the middle of the lower part of the left parietal bone; at this spot the bone was comminuted; some pieces were loose and others gone. The opening through which the brain protruded measured two inches and a half in diameter, and reached to the eminence in the centre of the bone; the lower border was formed by loose pieces of the parietal bone, united and firmly bound together by fibrous tissue; the meningeal artery had just escaped laceration. At the anterior part of the wound was a small piece of bone half an inch square, which was firmly fixed upon the anterior inferior angle of the parietal bone; the periosteum had disappeared, an ossifying fibrous tissue was formed between them, and the two pieces were fast growing together. A fissure passed forwards from the opening round to the other side of the head. The middle fossa of the base was broken into several pieces, and the roof of the orbit fissured.

These parts were firmly fixed and were rapidly uniting. The connecting substance between the fractures was of a hard bony tissue, and for an inch or more on either side of the fractures the inner surface of the skull was covered with minute bony granulations, producing an uneven rough surface; the bone too was highly vascular. The dura mater was firmly adherent to the bone near the hernia cerebri at its lower portion; internally it was firmly united to the brain for a considerable distance all around. Upon stripping off the membranes, the

arachnoid being greasy from an inflammatory exudation, the surface of the brain appeared quite perfect, except where the hernia had been cut off; it was flattened, so that all trace of a subarachnoid space was obliterated, the vessels of the pia mater appearing to ramify upon a smooth surface. The cerebral hemispheres were not symmetrical, the left being the largest; the corpus callosum was bulging outwards, and upon being cut into to expose the ventricles nearly three ounces of clear serum escaped. The septum lucidum was destroyed, and the central parts were soft. The left corpus striatum and thalamus were thrust upwards into the ventricle. At the anterior part of the left hemisphere, and in front of the fungus, was a large encysted abscess, about the size of a hen's egg; its walls were dense and tough, and it contained pus of ordinary consistence and colour, and free from all smell. The cyst was perfectly globular, one eighth of an inch thick, and consisted of a tough semi-transparent membrane of nucleated fibres; the interior was smooth and hard, and not unlike the surface of an old vomica in the lung; externally it was distinct from the brain-substance, and the latter fell off it by gravitation when it was held up. The brain-structure round it was of various hues, between a dead white and brown, several ochry patches being seen around.

The abscess was covered in by at least an inch of brain-structure.

The base of the middle hemisphere showed evident symptoms of old contusion and extravasation; the convolutions were of an ashy colour, from effused blood.

In this exceedingly interesting case of compound fractured skull, followed by an encysted abscess of the brain, it is curious to observe how the process of repair had gone on, even to the healing of the external wound and union of the fractured bones. The cerebral injury was doubtless the cause of death; and although this case invites comments, I must forbear, as my object in quoting it is merely to show a result of a local injury to the brain associated with compound fracture.

The primary results of the accident were very lasting; and the symptoms of arachnitis well marked. The benefit of venesection was well illustrated by the gradual subsidence of all symptoms of inflammation of the membranes.

The inflammatory changes going on in the hemisphere producing the abscess had probably been progressing for some time, and the uncertainty and irregularity of the symptoms well displays the insidious character of such a complication.

**CASE XXXIII.—FRACTURED SKULL ; DEPRESSED BONE ; LACERATION OF THE DURA MATER AND ECCHYMOSIS OF THE BRAIN ; ARACHNITIS, AND DEATH.**

A boy, *æt.* 7, in a quarrel with his mother received a blow upon the left parietal bone from the end of a poker which she threw at him ; no symptoms appeared after the accident, and he went about as usual, but upon the second day, or about forty-eight hours after the injury, he became drowsy, and was consequently brought to the hospital. He was admitted partially unconscious, with a hot skin, contracted pupils, and evident early symptoms of arachnitis ; there was also a punctured wound of the scalp, with depressed bone, over the left parietal bone. Mr. Cock trephined the part and raised the depressed bone, which was quite loose and driven in. The membranes were torn through, and brain-matter showed itself. The symptoms, however, continued, and he died comatose three days after his admission, and the fifth after the accident.

At the post-mortem examination, brain-matter was seen protruding through a small circular hole in the left parietal bone. Upon removing the calvaria, acute purulent arachnitis was seen covering the whole brain, and extending downwards to the base, which was equally involved.

The brain itself corresponding to the wound was ecchymosed and soft ; in other parts it was healthy and uninjured. The other viscera were healthy.

In the cases just quoted fracture and depression of bone were produced by a direct blow, accompanied with injury to the dura mater and brain at the seat of fracture alone ; there was no great shaking or concussion of the brain to cause laceration of its structure and extravasation, but a purely local injury. Arachnitis and softening of the brain, where bruised, followed, and with it the death of the patient. Such an inflammation is almost a constant consequence of any real



laceration of the membranes, or of the brain-structure, when ever it occurs, either from direct injury, as in the case just quoted, or in others produced by a severe concussion by *contrecoup*.

It remains to quote an example or two of extreme local injury to the brain, followed by the same arachnitis and death.

CASE XXXIV.—COMPOUND FRACTURED SKULL ; ESCAPE OF  
BRAIN-MATTER ; ARACHNITIS, AND DEATH.

A railway guard, æt. 34, when travelling in a third-class railway carriage, lent forwards out of the window and received a blow against an archway, when the train was in moderate motion and about to stop. He got out of the carriage and walked into the station, and was at once brought to the hospital. He was admitted without a brain-symptom, and perfectly rational, with extensive wound over forehead, and comminuted fracture of the frontal bone; the brain-substance was also freely exuding. Some dozen or more pieces of bone were removed by Mr. Forster, and water-dressing applied to the wound. He soon, however, became drowsy, and this steadily passed on to coma, followed by marked symptoms of arachnitis, and death upon the fifth day.

Upon removing the calvaria, a round hole, the size of a crown, was seen in the frontal bone, the inner table being fractured much more extensively than the outer. The frontal sinuses were opened, and the fracture extended through the ethmoid bone, and *longitudinally* through the body of the sphenoid and basilar process of the occipital to the foramen magnum.

Beneath the opening in the frontal bone the dura mater was torn through, and brain-matter, mixed with blood and lymph, freely exuded.

Upon removing the membranes no pus was seen beneath, but the brain was contused and pulpy, particularly at the anterior edge of the *right* lobe, and this softened condition extended into the medullary substance. The *left* lobe was less contused, but in one spot the brain was breaking up, and in another blood had been effused.

Upon the right side of the brain was acute arachnitis, with lymph completely covering the arachnoid.

The ventricles were healthy, and also the viscera.

This instance well proves to what an extent the brain-surface may be injured, and the functions of the brain left undisturbed, for as long as the central ganglia are uninvolved the vital functions are not materially affected. The subject of the injury in the case just quoted was not rendered even unconscious by the violence done to the anterior portion of the brain, and it was not till secondary inflammatory mischief appeared that any marked disturbance of the cerebral functions became manifest.

This secondary inflammation is the one point always to be feared in all injuries to the brain or its membranes; it may follow a slight concussion or the severest injury; and it is from such a complication that the majority of injuries to the cranium and its contents terminate fatally.

**CASE XXXV.—COMPOUND FRACTURED SKULL FROM A PISTOL-SHOT WOUND; DESTRUCTION OF THE UPPER SURFACE OF THE CENTRAL HEMISPHERE; SECONDARY INFLAMMATION OF BRAIN AND ITS MEMBRANE; DEATH.**

A man, æt. 85, having for some years shown some symptoms of insanity; attempted suicide by firing a loaded pistol off close to the right temporal region. He was admitted into Guy's, under the care of Mr. Birkett, soon afterwards, with a lacerated scalp-wound over the right temple, and fractured skull; the patient was quite sensible, and besides the local injury there were no symptoms of injury to the brain. Upon the day following some slight febrile symptoms appeared, but still no cerebral disturbance; upon the second day, upon examining the wound, a sharp edge, previously regarded as being bone, was found to be the edge of a bullet; this was extracted, and found to be almost separated in two; one of the cut surfaces was jagged and the other smooth, so it appeared that it had been fired against a sharp edge of the fractured bone, and this caused its separation. As it appeared probable that some loose portions of bone might be injuring the brain, the trephine was

applied, and some small pieces of bone removed. The dura mater was then seen to be lacerated and brain injured.

On the third day the man was somewhat drowsy, although quite intelligent; febrile disturbance still existed; pupils natural. On the fourth day he was attacked with two different seizures of general convulsions and obstinate hiccough; these passed away, and left him drowsy, but sensible. On the fifth day he was more dull, and pupils were dilated. On the sixth he became quite sensible, speaking to his dresser, and there was no paralysis; coma, however, came on, and death in one hour.

*Autopsy.*—On the right temple there was a wound three inches long, and the edges were sloughing. Upon removing the scalp, a brown decomposing mass protruded through the bone. This opening was of an oval form, an inch and a quarter long by three quarters of an inch broad, including a small piece of the anterior inferior angle of the parietal and frontal bones just above the sphenoid.

The laceration of the dura mater could not be well defined, owing to the sloughing which had taken place. The brain beneath the injury was of a brown and greenish colour, in fact, only a slough, within which was a small loose piece of bone about the sixth of an inch in diameter; upon dividing the hemispheres, nearly the whole of the right was sloughing and infiltrated with blood, involving the anterior and outer walls of the lateral ventricles, and the internal surface was stained with blood. The corpus striatum and thalamus were uninjured.

There were some small pyæmic abscesses in the lungs as well as in the liver.

Like the last case quoted, we find that a considerable local injury to the brain-substance, even with loss of cerebral material, was unaccompanied with any marked disturbance of the cerebral functions; and, like the last, the fact may be accounted for by the central nervous ganglia and base of the brain being left comparatively sound.

In both, however, secondary inflammation followed in the injured parts, and subsequently softening and extensive destruction; in this last example, however, the mind was clear to about one hour previous to death. The convulsions upon the

fourth day indicated meningeal complications, and the hiccough is a symptom worthy of remark, as it is not an unusual symptom of cerebral disease, and when of a very obstinate character should always lead the practitioner to suspect brain-disease, and accordingly direct his attention to that quarter.

#### *H. Fracture of the base of the skull.*

The consideration of the subject of fracture of the base of the skull now claims our attention; not because the principles which apply to the other injuries to the cranium and its contents are not applicable to such cases, but because such injuries have symptoms and results which are somewhat peculiar to themselves.

A fracture to the base alone is of no more consequence than a fracture of another part, if it should be unassociated with any injury to the brain itself; but as the base of the brain is the most delicate, and any injury to it is sure to be followed by severe, if not fatal, symptoms, the subject of fracture of the bones upon which it rests becomes proportionably of interest.

A fracture of the base of the skull may be associated with all the intracerebral injuries which have been illustrated in the previous pages; it may be complicated with simple concussion of the brain, or with the severer form associated with laceration of the brain-structure, or extravasation of blood upon or within the brain itself. If blood is effused there may be compression of the brain and death, and the same end may be produced by a secondary inflammation of the membranes and injured parts.

Upon the whole, it is difficult to separate the two classes of cases, as the dangers arising from injuries to the skull do not depend upon the seat of fracture, but upon the injuries to the cranial contents; and as the same injuries may be produced, or rather may be associated, with fractures of the base, the complications and dangers are the same in each.

Having, then, so far stated that the dangers of all forms of fracture of the skull are really alike, and that the same intracerebral complications attend fractures of the vault as of the base, I will now proceed to illustrate the special symptoms

which are generally regarded as being diagnostic of such injuries, by the brief analysis of cases from my note-book.

Amongst thirty examples which my note-book produces there are twelve cases associated with simple concussion, and in all recovery took place. In three cases the fracture extended through the orbit, as indicated by subconjunctival ecchymosis. In eight examples there was hæmorrhage from the ears; in all this was followed by a discharge of serum, and in seven cases associated with paralysis of the facial nerve upon the same side. In these cases it is quite fair to conclude that the line of fracture extended through the petrous portion of the temporal bone. In two instances there was bleeding from the nose. In one case there was a serous discharge from the ear, accompanied with paralysis of the facial, and in one following hæmorrhage from the ear, but unaccompanied with paralysis.

To test the value of these different symptoms, as indicating fracture of the base, in various positions, the following analysis of the fatal cases will prove of value; and, taking the symptoms separately, subconjunctival hæmorrhage will first claim our attention, as being a symptom tolerably accurately marking a fracture through the orbital plate. In the eighteen fatal examples this symptom was manifested in four instances; in one and all the line of fracture extended through the orbit.

In two cases there was copious hæmorrhage from the ear; in both these the fracture passed through the petrous bone.

In three examples there was some epistaxis; in one of these the fracture extended across the ethmoid bone; in one the frontal sinuses were full of blood and fractured; and in the third the tympanum was found full of blood and the membrana tympani perfect, and upon careful examination the lateral sinus of the brain was found to have been lacerated.

Seven of the eighteen fatal cases died from direct injury to the brain, the post-mortem examination in all revealing severe contusion or laceration of the brain-structure, with effusion of blood upon the surface of the brain or upon the membranes.

Another seven cases died from arachnitis as a result of the injury, in four of these there being contused brain, and in one ecchymosis of the ventricles; in two cases there was no evidence of contused brain, nor was there any effusion of blood; in one interesting case the inflammation spread from the internal ear.

In three the cerebral mischief was complicated with some thoracic or abdominal injury, which caused death ; and in one instance hæmorrhage was the immediate cause of death.

With this brief analysis of the cases I will quote a few of the most interesting examples.

**CASE XXXVI.—FRACTURED BASE; SPINE DRIVEN INTO THE CRANIUM; BRAIN EXTENSIVELY BRUISED AND LACERATED.**

A labouring man, æt. 36, in falling off a scaffolding, pitched upon his head ; he was taken up perfectly unconscious, and brought to this hospital, where he died a few seconds after admission.

Upon examining the body after death, it was clear that the weight of the body, as conveyed through the spine, had completely driven the spinal column into the skull, the base, for about one inch round the foramen magnum, being detached and pressed inwards upon the brain ; this was much lacerated and contused from the pressure of the displaced bone ; fissures radiated upwards from this spot.

This is a most marked instance of fracture from so-called *contre-coup*, and is given here as illustrating the only method by which such an accident could take place ; the vertex, upon which the man alighted, was uninjured, but the whole force was concentrated on the body, and conveyed through the spinal column to the skull ; it is in reality, however, a direct application of the force and not a result of *contre-coup*, which consequently can never produce a fracture.

It is hardly necessary to quote cases illustrating contusion or laceration of the brain from *contre-coup*. This is the most frequent cause of injury to the brain, with or without extravasation of blood upon the surface.

In no less than fourteen instances of the eighteen fatal cases did this complication take place, and in those examples where the brain was contused at the seat of fracture the brain at the opposite side of the skull was, as a rule, found in a more injured condition.

When blood is effused upon the surface of the dura mater, there is generally found some effusion within the mem-

branes or some injury to the brain. Amongst the seven instances where this effusion was detected, in five there was also effusion of blood within and upon the surface of the brain. In the other two cases arachnitis was the cause of death.

**CASE XXXVII.—FRACTURED BASE, ASSOCIATED WITH COPIOUS HÆMORRHAGE FROM THE NOSE, NONE FROM THE EAR; LACERATION OF BRAIN BY CONTRE-COUP; SEVERE FRACTURE OF BASE; LACERATION OF LATERAL SINUS; COPIOUS HÆMORRHAGE FROM NOSE AND MOUTH; MEMBRANA TYMPANI ENTIRE.**

A man, æt. 52, fell from a height of thirty feet upon his skull; he was rendered completely unconscious, and when admitted into the hospital was in a dying condition, blood flowing rapidly from his nose. He died two hours after the accident.

*Autopsy.*—Beneath the scalp much blood was effused; upon the *left* side of the skull there was an extensive fracture. The petrous portion of the temporal bone was completely separated from the mastoid, and squamous; the fracture in front extending partly into the sphenoid in the middle fossa, and posteriorly passing across the groove for the lateral sinus where formed by the parietal and mastoid bones; it then extended across the parietal, crossed the sagittal suture at its centre, and nearly reached the frontal bone. There was considerable effusion of blood into the pia mater, especially upon the *left* side and at the cerebellum; the velum interpositum was filled with blood. In the posterior lobe of the left cerebrum there was a laceration, three inches in length, extending through the gray matter (by *contre-coup*). A small laceration was observed also near the vertex. The right lateral sinus was also torn. The right tympanum was full of blood, but the membrana tympani was entire. The stomach was full of blood, which had been swallowed. Other viscera were healthy.

This case is a good illustration of fracture of the base and injury to the brain from a severe shake, as produced by a fall from a height upon the head. The fracture radiated from the seat of injury, and caused absolute separation of the left petrous bone; the left cerebrum was severely lacerated by

*contre-coup*, and blood extensively extravasated into the pia mater. The one marked symptom of severe epistaxis is interesting, connected with the absence of hæmorrhage from the ear, and the perfect condition of the *membrana tympani*, the blood having probably found its way from the *tympanum* through the Eustachian tube, thus causing severe epistaxis, and filling also the stomach with effused blood.

**CASE XXXVIII.—FRACTURED BASE; SEVERE HÆMORRHAGE FROM THE RIGHT EAR, AND SUBCONJUNCTIVAL ECCHYMOsis; LACERATION OF CAROTID ARTERY AND LATERAL SINUS; LUNGS FILLED WITH BLOOD; DEATH FROM HÆMORRHAGE.**

A man, æt. 30, when at work, ropemaking, had his head jammed between two cog-wheels; he was rendered perfectly unconscious, and was admitted in this condition, bleeding copiously from the right ear, with subconjunctival ecchymosis, and in a dying condition. He lived two hours only after the accident.

After death there were no external signs of injury; upon removing the scalp the calvaria presented a marked disposition for the bones to separate at the coronal suture. The base of the skull was fissured in all directions, a fracture extending across the ethmoid and orbital plates and basilar process. The left carotid artery had been lacerated in the temporal bone, and the left lateral sinus was also opened; the *membrana tympani* upon the left side was also ruptured. The brain was uninjured, and there was no effusion of blood between the membranes. The lungs were filled with blood, and also the bronchial tubes, the air-cells being full.

There was no doubt, in this case, that death had resulted directly from hæmorrhage, the source being the ruptured carotid artery; the bleeding from the ear was very profuse, and it is very probable also that blood passed down the Eustachian tube, and thus passed into the lungs, the nervous system having been so paralysed as to lose its power, and thus allowing the glottis to remain patent.

In this case there was no injury to the brain, the accident



having been produced by compression of the base, and the brain consequently received no shake.

In the cases already quoted, severe lacerations of the brain, contusion of the brain, hæmorrhage from the ears, nose, and beneath the conjunctiva, have been illustrated as direct symptoms of fracture of the base. In the following example a secondary result is to be represented, death having been caused by arachnitis.

**CASE XXXIX.—FRACTURED BASE OF THE SKULL; CONCUSSION; EXTRAVASATION OF BLOOD EXTERNAL TO THE DURA MATER; ARACHNITIS, EXTENDING FROM INTERNAL EAR; DEATH.**

A carman, of temperate habits, æt. 35, when at work was prostrated by a pocket of hops falling from a height upon him; he fell out of the cart upon the left side of his head. He was admitted into Guy's under the care of Mr. Hilton, insensible, with a slight wound over left frontal bone and temple, and with ecchymosis of the eyelids; during the following night his intelligence returned, and he answered questions when roused, but at times he muttered incoherently. During the first day he began to vomit, pupils became contracted and breathing stertorous, but there was no paralysis; his head was shaved, and a good enema given. The second day he was very restless, skin hot, and pulse quick; he asked for what he wanted; there was slight paralysis of the left facial nerve.

Hyd. c. Cret., gr. iij;  
Pil. Dov., gr. v; bis die.

The *third* day he was improved, tongue was moist, and skin less feverish; pulse 60, soft. On the *fourth* day he had passed a restless night, being slightly delirious; he answers when spoken to, but was very drowsy; skin hot, tongue much furred, but moist; pulse hard and full.

Julep. Ammon. Acetat. c. Vin. Ant. Tart., ℥xx, 4tis horis.

On the *fifth* day the tongue was much drawn to the right side, the left side being paralysed; pupils were unequal, left dilated, right contracted, the left being scarcely sensible to

light. On the *sixth* day his delirium became more marked, and he complained much of pain in his head. On the seventh day there was strabismus of the *left* eye, and the symptoms of arachnitis were more marked, delirium increased and coma followed, the man dying upon the tenth day.

Upon post-mortem inspection, the left side of the scalp was found to be extensively ecchymosed. Upon removing the calvaria an extensive fracture was detected; the squamous portion of the left temporal bone was fractured in several parts anteriorly, so that a square piece, one inch in measurement, was quite moveable, but not depressed; from this a fracture extended obliquely across the parietal as far as the occiput, almost reaching the base; a second passed across the petrous portion of the temporal bone, from the foramen spinosum, about one eighth of an inch external to the internal auditory canal, and terminated at the posterior lacerated foramen. The middle meningeal artery was divided upon the left side, and a layer of blood, a quarter of an inch thick, placed between the bone and the dura mater. Upon removing the dura mater, the arachnoid was found drier than natural, but the pia mater was deeply injected over both hemispheres. At the lower part of the cerebellum the pia mater was infiltrated with pus, which also completely surrounded the medulla oblongata, the eighth and ninth pairs of nerves, the pons varolii, and reached to the subarachnoid space; a thick layer of lymph also surrounded the optic commissures. The brain was firm and injected. The ventricles contained about  $\text{ʒij}$  of slightly opaque serum. Upon examining the internal ear, it was found filled with pus, the fracture having passed through the labyrinth. The membrana tympani was entire; the facial nerves softened.

The preceding case affords an interesting example of fracture of the base without any primary diagnostic symptoms, the line of fracture having, in the anterior and middle fossa, missed the orbit and the middle ear with the tympanum. The cerebral symptoms were at first only those of concussion of the brain; when reaction was established, after about twenty-four hours, vomiting occurred, with paralysis of the facial nerve; symptoms of arachnitis then made their appear-

ance, followed by paralysis of the tongue and strabismus, indicating some mischief to the roots of the nerves at the base. Other symptoms of effusion set in, followed by coma and death upon the ninth day.

The autopsy revealed the true source of all the mischief. There could be little doubt that the arachnitis had spread from the internal ear along the nerves to the general arachnoid, and, involving the nerves of the base, had produced strabismus, paralysis of the tongue and face, coma, and death.

The fact that there had been considerable effusion of blood external to the dura mater from rupture of the meningeal artery is worthy of note, not being connected with any paralysis; and although the clot was at least a quarter of an inch in thickness, and the brain consequently compressed to that extent, it maintained its functions, tending to prove what all experience of injuries to the brain indicates, that local mischief, although severe, may produce but very slight, if any, symptoms, but that general injuries, although slight, may be, and generally are, followed by the worst symptoms.

Having now carefully considered the whole subject of concussion and injuries to the brain, including compression and the extravasation of blood, associated or not with fracture of the skull, the following inferences may, I believe, be fairly drawn:

1. That injuries to the skull are of importance only in as far as they involve the cranial contents; that the local mischief is of small importance compared with the intracranial; and that uncomplicated fracture of the cranium is seldom followed by any injurious symptoms compared with any general injury to the cerebral structure.

2. That a *slight* concussion of the brain, whether associated with a fracture of the vault or base of the skull or not, will generally do well, and will be known by only a slight or temporary suspension of the cerebral functions, independent of the symptoms of local injury.

3. That a *severe* concussion of the brain, whether associated or not with fracture of the vault or base of the skull, is liable to produce primarily contusion or laceration of the brain-structure, either upon its surface or within its ventricles; that

extravasation of blood may also take place, either upon the brain or within its structure; and that, consequently, if the *primary* effects of the accident do not cause a fatal termination, a *secondary* encephalic inflammation probably will.

4. That *contre-coup*, the result of a severe shaking or concussion of the brain, produces severe contusion and laceration of the brain, and with such, extravasation of blood; but that *contre-coup* never yet produced fracture of the skull, and it is doubtful whether it ever produced a rupture of the middle meningeal artery, and, as a consequence, extravasation of blood upon the dura mater and compression of the brain.

5. That a *fall upon the vertex from a height, or a blow upon the head from a blunt instrument*, may be followed by fracture of the skull, or otherwise; but such an accident produces, as a rule, a general concussion of the brain, and with this may be associated any of its complications, such as contusion or laceration of the brain, either upon its surface or within the ventricles, and consequently with effusion of blood.

6. That *falls upon a pointed object, and blows with a sharp instrument*, as a rule, are followed by a local fracture; and that if the brain is injured, it is at the seat of injury. As a consequence, the symptoms may be accounted for by local causes only, and the primary treatment to be adopted must be directed by local considerations.

7. That when symptoms of *compression of the brain* immediately follow an injury to the skull produced by a *fall from a height, or a blow from a heavy and blunt instrument*, the cerebral injury, as a rule, will be general, and the brain will subsequently be found contused and lacerated, particularly at the base, by *contre-coup*; and that if extravasated blood should be found external to the dura mater, blood will also be found upon the surface of the brain, or within its membranes.

8. That if symptoms of *compression of the brain* follow a *local injury produced by a fall upon a sharp object, or a quick blow from a pointed one*, that such symptoms, as a rule, are produced by *local causes*, such as depressed bone, or extravasation of blood from rupture of the middle meningeal artery.

9. That such *local injuries*, when giving rise to general symptoms, should be treated by elevation of the bone, if depressed; but if no general symptoms are present, unless

the bone is comminuted and can be easily removed, no operation is indicated; a local pressure of the brain alone, when uncomplicated with symptoms, generally doing well.

10. That when *compression of the brain* follows as a secondary result of a *local injury* over the course of the meningeal artery, that is, after an interval of time, when reaction has been established, although no depressed bone may be present, it is probably produced by a rupture of one of the arterial branches; the operation of trephining may then be performed with a chance of success, although it is rare to find a very local extravasation, the blood generally passing downwards towards the base, where the operator cannot reach.

11. That when *compression of the brain* follows, as a secondary result, a *general injury*—although that compression is evidently produced by extravasation of blood—the operation of trephining is useless, if not injurious; for although blood may be effused from rupture of a meningeal artery, there will certainly be found some contusion or laceration of the brain itself, or extravasation within its membranes, which the operation cannot relieve, but is sure to increase.

12. That *encephalic inflammation* may follow any concussion or injury to the brain, however slight, whether complicated with fracture or otherwise; and that the danger of such a result is in proportion to the encephalic injury. In cases of contusion or laceration of the brain, with extravasation of blood, it is almost sure to follow, and, as a rule, it will produce a fatal termination. This inflammation may appear within a few hours of the accident, or it may be postponed for some days; it may be very rapid in its course, or very insidious in its nature. If the brain itself is the seat of the disease, it is generally insidious, and either a diffused or local abscess will subsequently be detected; but if the membranes are involved, effusion, coma, and death will rapidly take place.

13. That the *operation of trephining* is perfectly useless in cases of severe concussion of the brain, whether associated or not with fracture, although it may relieve compression of the brain from local conditions; for the brain is generally injured by *contre-coup* at its base, or in positions where no operation can be of benefit, but must prove injurious.

14. That the *operation of trephining* may prove of value

in *local injuries* to the skull or brain, when associated with symptoms of compression and depression of bone, or from the local extravasation of blood. In the former case, when the brain and membranes are uninjured, success may fairly be anticipated; but in the latter, the chances are decidedly against it, as blood, if effused, is seldom local, but passes downwards towards the base.

15. That fractures of the *base of the skull* may take place alone, and be marked by only special symptoms; that they may be associated with, and are generally found in, all severe fractures of the vault, when produced by a heavy fall or blow, the fissures radiating downwards in a direction parallel to the forces employed.

16. That *fractures of the base* may be complicated with encephalic injuries similar to the fractures of the vault, and may consequently be manifested by general symptoms as well as special ones, in severe cases the former completely masking the latter; the injury, however, may generally be diagnosed, the mode of injury indicating the probability of its occurrence.

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### CHAPTER III.

#### INJURIES TO THE SPINE.

The close analogy which exists between the brain and spinal marrow, anatomically and physiologically, is completely carried out in their pathology; and the consideration of the results of injuries to the latter is much simplified when the former is well understood. In former pages the results of injuries to the skull and its contents have been carefully illustrated by cases, together with the chief complications, and the symptoms indicating the various pathological conditions which are found in practice. It has been shown that the functions of the brain may for a time be interfered with or suspended by a simple shake or concussion of its substance; that a severe concussion may be found associated with contusion of the brain and extravasation of blood, either upon its surface or within its structure; that fractures of the skull are of importance in proportion to

the amount of encephalic complications ; and that inflammation of the nervous structure itself, or of its membranes, is too frequently the result of any such injuries, however slight.

When we approach the consideration of the injuries to the spine and its contents, precisely similar results can be deduced. It can be shown that the functions of the cord may be interfered with or paralysed by a simple concussion, and that in severe instances capillary ecchymosis of the nervous structure, or extravasation of blood within the membranes, may also be produced.

Examples may be quoted illustrating the complete or partial disorganization of the cord from the displacement of a fractured or dislocated vertebra, and also others showing the results of inflammatory action following upon any injury.

The secondary results also of injury to the spine, as shown by complete paralysis of all its functions, from a chronic inflammatory change in the tissues of the cord, could also freely be illustrated ; but as these secondary cases come more under the notice of the physician, they will claim only this passing notice.

Space will hardly allow me to quote many examples of each complication, nor is it necessary to do so ; the thoughtful practitioner will soon understand how such injuries are produced, and by what symptoms they will be manifested ; the consideration of the functions and position of the cord will indicate to him the result of any injury to its structure, and will point out the symptom by which such injuries can be diagnosed. A simple concussion of the spine may produce a partial or complete suspension of the cord's functions ; by rest and quiet these symptoms may disappear, and a perfect recovery take place. A more severe concussion may be associated with some injury to the nervous structure, or some extravasation of blood upon or within the cord itself ; such a complication will necessarily be associated with more marked symptoms, and partial or complete paralysis and anæsthesia will be present, varying according to the extent of the mischief and the seat of the injury.

When the spine is fractured or dislocated, like complications may be produced—the cord may receive a simple concussion, or a more serious form of injury may be the result.

The cord may be completely pulped by pressure, or injured to any extent from even a slight bruise, and the symptoms

indicating such a mischief will vary from a partial to a complete destruction of its functions.

Following any one of these injuries, an inflammation of the cord or of its coverings may be excited, and with it the peculiar symptoms and results of such an action.

My notes yield me twenty-five good examples of simple concussion of the spinal cord, either of the cervical, dorsal, or lumbar region, produced by a fall upon the back in either of the above regions. The symptoms produced varied to a great extent; more or less paralysis of that portion of the body supplied by nerves emanating from the injured centre was the chief symptom, and anæsthesia, or loss of sensation, was present in almost all the instances. Retention of urine, also, was a common complication. In sixteen of these instances by simple rest these symptoms gradually disappeared, and a perfect recovery ensued.

In three cases the paralysis, &c., was complicated with severe local pain over the seat of injury, and by the application of a cupping-glass and local bleeding this was relieved, followed by convalescence.

In one case recovery was very slow, and convalescence was hastened by the man being electrified over the spine.

In another example pain in the partially paralysed limbs followed the injury, indicating some excess of action in the centre; and some slight mercurial, in the form of the Hyd. c. Cret. c. Pulv. Dov., ana gr. iij, was given twice a day with marked benefit, pain disappearing and a cure taking place. In one case the paralysis and loss of sensation of the whole body below the neck was perfect, and the concussion was so severe as to completely paralyse the spinal centres, allowing an involuntary discharge and constant flow of urine; this lasted for about twelve hours, when power of the limbs gradually returned, followed by steady convalescence.

It is thus seen that in the simplest form of concussion of the spine there is but slight paralysis and loss of sensation of that portion of the body supplied with nerves from the injured centres. That in more severe cases there is some retention of urine, arising from the loss of voluntary power over the muscles which regulate micturition. That in still more perfect examples of concussion the paralysis and anæsthesia of the body



may be perfect, and associated with absolute paralysis of the bladder and all its muscles, allowing the flow of urine from its cavity as secreted. (This condition of the bladder must not be confused with the involuntary discharge of urine from an over-distended viscus, which may be seen in the former and simpler class of cases.)

In all cases such as these, if a subsequent inflammatory condition does not take place, a perfect recovery may ensue, as all these symptoms may be produced without any permanent change or injury to the nervous structure.

The treatment most beneficial is that which succeeded in the examples already quoted, perfect repose in the horizontal position being absolutely essential.

In instances where severe local pain is present, the application of a cupping-glass, with or without the extraction of blood, will be found of benefit. When there are symptoms of excess of reaction, some mild mercurial, such as the gray powder or the bichloride, should be employed, and the local application of a blister is often advantageous. In those cases where recovery is very slow, unattended with any symptoms of inflammatory action, electricity applied to the spine and muscles involved should also be advised, and under these simple means recovery may generally be expected.

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## CHAPTER IV.

### FRACTURES AND DISLOCATIONS OF THE SPINE.

The spinal cord, like the brain, is so carefully protected from injury by its osseous covering, and any slight injury to its delicate structure is so sure to be followed by severe symptoms, that it can be no subject of surprise that fractures and dislocations of the spine are injuries of a very grave nature, and that it is rare for such accidents to take place without the cord itself being more or less involved. The clinical experience of Guy's Hospital for the last five years fully bears out this idea; for out of twenty-four examples of fracture and dislocation of the spine, three only have escaped with their lives; and the functions of the cord in these instances had not perfectly been restored.

I have classed fractures and dislocations of the spine together, as these accidents are frequently combined. It has been generally taught that the latter form of accident is exceedingly rare, but my own experience leads me to believe such an opinion to be erroneous; for amongst the twenty-four cases which my notes yield me, including all the examples of such an injury to the spine, admitted into Guy's during the last five years, six are cases of pure dislocation of the spine, three of fracture, and eight of fracture and dislocation combined; and the fact in these seventeen examples was verified by a post-mortem examination. In the remaining seven cases a fracture was diagnosed, but not proved.

Of these seventeen cases of fracture and dislocation of the spine, in which a post-mortem examination was made, in ten the seat of injury was in the cervical region, in seven in the dorsal.

Amongst the injuries to the cervical region—

Five were pure dislocations, two between the fourth and fifth cervical, two between the fifth and sixth, and one between the seventh cervical and first dorsal.

Five were dislocations and fractures combined; in each the body was dislocated forwards from the one below, the articular processes were separated at their joints, and in each there was a fracture through the spinous processes or laminæ of the dislocated vertebræ, the dislocation taking place at the lower surface of the third, fourth, fifth, sixth, and seventh vertebræ respectively.

Amongst the injuries to the dorsal region—

One only was a pure dislocation, taking place between the eleventh and twelfth vertebræ; the ligaments confining all the joints were ruptured, and the body of the eleventh thrown forwards.

In three the eleventh dorsal vertebra was dislocated forwards from the twelfth, tearing through the intervertebral substances, and associated with fracture of some portion of the arches of the lower vertebræ; the articular surfaces, however, in all instances, being singly or doubly dislocated.

In the three remaining instances a fracture alone existed.

In one the fourth and fifth were comminuted ; in one the eighth, ninth, and tenth were fractured through the bodies and laminæ ; and in the third the twelfth dorsal with the three first lumbar were extensively fractured.

In the remaining seven cases all were in the dorsal region, and about the tenth, eleventh, and twelfth vertebræ ; and three of these recovered.

From the preceding analysis it would appear—

1. That injuries to the spinal column are more frequent in the dorsal than in the cervical region, but only in the proportion of 58 to 41.

2. That in injuries to the cervical region simple dislocation of the spine is as frequent as the combination of dislocation with fracture. That in all such injuries the intervertebral substance is torn through, the upper vertebra being, as a rule, thrown forwards ; and that where fracture takes place it is generally at the spinous process, and not in the bodies.

3. That such dislocation may take place between any of the bodies of the cervical vertebræ ; that between the fourth, fifth, and sixth being the most common.

4. That in injuries to the dorsal region pure dislocation is very rare, although it may occur ; that such injuries generally take place between the tenth, eleventh, and twelfth vertebræ ; that the body of the superior is generally dislocated forwards, and the body of the inferior is as generally fractured ; and that some portion of the arch of the inferior vertebra is, as a rule, broken.

Having carefully considered the condition of the spinal column after injury, and the form of accident which is most likely to occur, we will now proceed to the consideration of the condition of the cord itself, and we shall find that such accidents are generally complicated with very serious and destructive changes within its structure.

Amongst the twenty-four examples there were nineteen in which there was most perfect paralysis below the seat of injury immediately after the accident ; in eighteen of these there was also perfect anæsthesia, and in one hyperæsthesia.

In two cases there was no paralysis at the time of injury, but when reaction set in paralysis appeared.

In one case there was no paralysis or injury to the cord.

In two the paralysis was but partial, and both recovered.

The condition of the cord in seventeen cases in which a post-mortem examination was made revealed the fact—

That in one case the cord was completely divided at the seat of injury, the ends being one inch apart.

That in eight instances the cord was completely crushed, and in all these perfect paralysis had been present below the seat of injury.

That in four cases the cord was bruised, blood being extravasated within its structure. In all these cases there was paralysis, and in all the injury was in the cervical region. In one of these hyperæsthesia existed.

In two cases the cord was found uninjured, but in one of these there was secondary paralysis from the effusion of blood external to and within the membranes.

In two instances the cord was found softened from inflammatory action, the patients surviving the injury ten and sixteen days. In both of these cases there was secondary paralysis—in one after the period of reaction had taken place, and in this blood was effused within the membranes compressing the cord; in the second there was also effusion of blood external to the membranes.

In three cases only was blood found effused within the membranes; in two of these the cord was sound, and in both secondary paralysis took place; in one there was paralysis after the injury, and blood was found effused within the cord itself.

In two instances only was blood found external to the dura mater; in one of these secondary paralysis existed upon the fourth day, and the cord was found softened from inflammatory action, and in the other it was associated with hæmorrhage within the membrane and compression of the cord.

It appears, then, in addition to the conclusions given in the last page—

5. That a fracture or dislocation of the spine may take place and the cord remain uninjured ; that such an escape is quite exceptional, and that, as a rule, the cord is seriously involved.

6. That in at least seventy-five per cent. of all cases of fracture or dislocation of the spine the cord is irreparably injured and disorganized, either by the primary mechanical pressure of the dislocated bone, or by the effusion of blood within its structure.

7. That in the remaining twenty-five per cent. the injury may be partially or wholly recovered from, there being no disorganization of the cord ; temporary, perfect, or partial paralysis may be present, and unless some secondary inflammation take place, a recovery may follow ; in these cases it is fair to believe that the cause of the paralysis is merely some extravasation of blood external to the cord.

Having thus far dwelt upon the pathology of this interesting class of injuries, it may not prove without advantage to consider briefly the duration of life and some of the symptoms and causes of death ; and reviewing the ten examples of injury to the cervical region, it appears that in two only was life prolonged beyond forty-eight hours after the accident ; in one of dislocation between the fourth and fifth vertebræ, with disorganization of the cord, the patient survived but thirteen hours ; five lived only thirty-six, and two forty-eight hours. In all these the disorganization of the cord had taken place opposite the fifth or sixth vertebra.

In two examples the injury to the spine and cord corresponded to the seventh cervical ; one of these lived seventy-two hours, and the second seven days.

In all of the eight first cases the respiration from the commencement was diaphragmatic ; but in the two last, at the commencement, it was not so entirely, but in one became so at the end of forty-eight hours, and the patient died twenty-four hours subsequently. In the second it became so upon the fourth day, and upon the seventh the man died.

Amongst the eleven fatal cases of fracture and dislocation of the dorsal vertebræ, eight died within eighteen days, the

most rapid death taking place at the tenth, at which period three died.

The remaining patients survived the accident 90, 134, and 232 days respectively.

8. It is fair, then, to conclude, that in injuries to the cervical spine death takes place more rapidly the higher the mischief to the cord exists, and that death generally takes place within forty-eight hours; and that when the injury is lower down, that is, below the seventh vertebra, the patient will not survive more than three days, when the respiration is also carried on through the diaphragm.

9. That in injuries to the cord in the dorsal region, if the patients survive beyond the seventeenth or eighteenth day, they may live for weeks; and that a gradual sinking, and the complication of a bed-sore, is too frequently the immediate cause of death.

I shall now proceed to quote some few examples of injury to the cord as the result of violence, selecting my cases only as they illustrate any complications of the cord itself, quite irrespective of the accident to the spinal column.

**CASE XL. — FRACTURE AND DISLOCATION OF THE SPINE IN CERVICAL REGION; NO DISPLACEMENT; CONCUSSION OF CORD; PARALYSIS OF THE LEGS, LEFT ARM, AND SPHINCTERS, WITH ANÆSTHESIA AFTER THE ACCIDENT, FOLLOWED BY HYPERÆSTHESIA; ECCHYMOSIS INTO THE POSTERIOR HORN OF GRAY MATTER ON LEFT SIDE, ALSO INTO ANTERIOR HORN ON RIGHT SIDE AND INTO THE POSTERIOR COLUMNS; DEATH THIRTY-FOUR HOURS AFTER THE ACCIDENT.**

Joseph K—, æt. 33, a coal-porter, when carrying a sack of coals down some stairs, fell, with the sack of coals falling upon him. Admitted immediately after the accident, with paralysis of the legs and left arm, and also of the sphincters; there was also entire loss of sensation in the left arm as high as the deltoid; he could feel about the feet and on the outer side of the thigh, but not upon the anterior and inner surface. The seat of sensation, however, was very variable,

returning to spots where it had just previously been absent ; apparently the most distant parts recovered first. There was slight priapism, and the breathing was diaphragmatic. After a few hours sensation returned in every part. As the skin became warm, he complained of pain when lightly touched. The day following, the sensibility of the surface appeared to be excessive, judging by his exclamations when the skin was touched or pinched. This was especially noticed in the right arm. Priapism, which existed when he was admitted, passed off after two hours, but returned the day following. He continued to have power to move the right arm, and died thirty-four hours after the accident.

*Post-mortem examination.*—Spine only examined.—There was no external trace of the injury ; the membranes of the cord were healthy. Opposite the fourth and fifth cervical vertebræ the substance of the cord was contused. On section there was found ecchymosis of the posterior horn of gray matter on the left side, and of the adjacent part of the lateral and posterior columns. There were also other limited spots of ecchymosis on the right side, one in the right posterior column, and one in the anterior cornua of the gray substance. The gray matter generally was hyperæmic from venous congestion, but there was no other lesion of it except at the two spots named.

Upon examining the spinal canal, after the removal of the cord, nothing abnormal was discoverable in the bodies of the vertebræ opposite the lesion of the cord ; but in dissecting off the posterior ligament it was seen that the body of the fourth was separated from that of the fifth, and that the left articular process of the fourth had been chipped off by the violent pressure of the lower against it.

The above case I have quoted at some length, as it affords an admirable illustration of extravasation of blood within the cord as the result of violent concussion ; it is true the bones were fractured, but as no displacement had taken place, such a fracture could not have affected the cord.

This case has been already published by Dr. Gull in the 'Guy's Hospital Reports' for 1858, and in his remarks upon it he draws attention to "the limitation of the injury, pro-

ducing paralysis of the left arm whilst the right retained the power of motion ; the immediate effects of concussion on the cord, producing anæsthesia for a few hours ; the return of sensibility, first, in the parts most distant from the injury ; and the development of hyperæsthesia."

**CASE XLI.—FRACTURE AND DISLOCATION OF SPINE BETWEEN FOURTH AND FIFTH CERVICAL ; CONCUSSION OF THE CORD ; RECOVERY OF POWER AFTER TWO HOURS ; SECONDARY PARALYSIS AS A RESULT OF THE EFFUSION OF BLOOD OUTSIDE THE THECA VERTEBRALIS ; DIAPHRAGMATIC RESPIRATION ; INTENSE HEAT OF SKIN ; DEATH IN FORTY-FIVE HOURS.**

Robert L—, æt. 40, having fallen backwards, with a heavy plank falling upon him, was admitted into Guy's, collapsed but sensible ; there was perfect paralysis of the left leg, partial of the right, and of both arms. After two hours he was able to flex his legs and grasp the hand, the skin also became warmer. No injury to the spine could be discovered. After six hours he said he was quite comfortable ; he passed a restless night, and the following morning, sixteen hours after the injury, he was found perfectly paraplegic, both in the upper and lower extremities, with loss of sensation, and priapism. The ribs scarcely moved in respiration ; the temperature of the skin increased ; abdomen tense and tympanitic. During the day the skin became intensely hot, and the breathing wholly diaphragmatic, and he died forty-five hours after the accident.

At the post-mortem examination there was no external evidence of injury to the spine. Upon dividing the soft parts there was found a separation between the fourth and fifth cervical spinous processes, and dislocation of the articular processes. The interspinous and capsular ligaments were torn through. There was extravasation of blood outside the theca vertebralis on its anterior aspect, the effused blood compressing the cord, which was otherwise uninjured, for after careful examination there were not found any signs of bruising of its tissue. The extravasation apparently arose from injury to the lower part of the body of the fourth vertebra, which had been fractured, and the intervertebral substance torn. The



calibre of the canal was slightly encroached upon by displacement of the fourth vertebra, but not so as to press upon the cord. The extravasation, though most abundant opposite the injury, extended downwards for some distance; the membranes of the cord were uninjured.

In this instance the symptoms which first followed the injury were only such as might be produced by a concussion of the spine, and the fact that they rapidly disappeared justifies the opinion, for any injury to the centres causes more durable symptoms. With the establishment of reaction appeared paralysis, fairly indicating some compression of the cord; and the subsequent condition revealed extravasation of blood external to the membranes. The paralysis of the muscles of respiration, with the exception of the diaphragm, was the cause of the rapid death, few patients living, as I have previously shown, forty-eight hours when such a condition was in existence.

The two examples already quoted illustrate the fact that extravasation of blood, external to and within the cord, may be produced by a violent concussion. The following case will prove that the same complication may be produced by pressure upon its substance.

**CASE XLII.—FRACTURE AND DISLOCATION OF THE CERVICAL SPINE; IMMEDIATE PARALYSIS BELOW THE SEAT OF INJURY; DIAPHRAGMATIC RESPIRATION; DEATH IN THIRTY-SIX HOURS; EXTRAVASATION OF BLOOD WITHIN THE SUBSTANCE OF THE CORD.**

J. W—, æt. 38, a sawyer, was admitted into Guy's, under the care of Mr. Birkett, with perfect paralysis of body and legs, and partial of the arms; there was paralysis also of the intercostals, and retention of urine. The respiration was entirely diaphragmatic, the man, just prior to his admission, having been swung into the air by an acquaintance and fallen upon his neck. The respiration became more difficult, and he died eighty hours after the accident.

After death the fifth cervical vertebra was found dislocated forwards from the sixth for about half an inch, tearing with

it a thin section of bone from the latter; the articular surfaces were dislocated and the arch fractured. The membranes of the cord were uninjured, and no blood was effused external to the cord; this was indented and softened at the seat of injury, and a section showed it to be of a dark red colour from effused blood within its substance. The lungs were gorged with blood and apoplectic; there was also effused blood along the spine, this blood probably coming from the apex of the left lung, which was injured.

**CASE XLIII.—DISLOCATION OF SPINE IN CERVICAL REGION BETWEEN SIXTH AND SEVENTH VERTEBRÆ; PARALYSIS OF BODY BELOW THE SEAT OF INJURY; DIAPHRAGMATIC RESPIRATION; DEATH IN THIRTY-SIX HOURS; CRUSHED CORD.**

W. S—, æt. 36, when drunk, fell down stairs upon his neck, bending his head forwards. He was taken up paralysed, and admitted into Guy's under the care of Mr. Hilton. There was complete paralysis of the body and legs, and partial of the arms. No excito-motory action could be exerted. The respiration was purely diaphragmatic, and he died thirty-six hours after the accident.

Upon subsequent examination no external signs of injury were present. Upon removing the soft parts about the spine, a gap was seen between the fifth and sixth spinous cervical processes, the ligaments were ruptured, and articular surfaces completely dislocated, allowing the finger to be passed inwards upon the cord; the fifth vertebra was torn from the sixth, through the intervertebral substance; there was no fracture, and the anterior ligament of the spine was not ruptured. The medulla was crushed, and of a red colour from the extravasation of blood within its structure.

**CASE XLIV.—DISLOCATION OF THE FOURTH CERVICAL VERTEBRA FORWARDS FROM THE FIFTH; PARALYSIS; DIAPHRAGMATIC RESPIRATION; DEATH IN THIRTEEN HOURS.**

G. W. D—, æt. 17, having when wrestling been thrown with his head under the arm of his adversary, was admitted under the care of Mr. Birkett, some hours after, completely paralysed

below the neck, and quite sensible. The respiration was carried on solely by the diaphragm, and he died in thirteen hours.

The muscles of the neck were infiltrated with blood, and the finger could be easily introduced between the spinous processes of the fourth and fifth cervical vertebræ. The fourth was found to be completely dislocated forwards from the fifth, tearing through all the ligaments and the intervertebral substance. The sheath of the cord was sound, but on opening it the medulla was found to be a mere red diffused mass from effused blood. The lungs were intensely congested, and in parts blood was effused into the tissue; the tubes also contained blood. The other viscera were healthy.

The two cases just quoted are fair illustrations of pure dislocation of the cervical spine with destruction of the cord, causing complete paralysis of the whole body below the seat of injury. The immediate cause of death in both was tolerably clear—the want of aëration of the blood, the act of respiration being carried on exclusively through the diaphragm. The post-mortem condition of the lungs in the latter case is one worthy of notice, blood actually being effused into the tubes as well as into the air-cells. This condition of the lungs is such as is usually found in such cases, the patient in these instances dying asphyxiated.

**CASE XLV.—DISLOCATION OF THE ELEVENTH DORSAL VERTEBRA, WITH FRACTURE OF THE TWELFTH; ANÆSTHESIA OF THE SCIATIC NERVES, BUT NO PARALYSIS; AFTER A FEW HOURS RETURN OF SENSATION, BUT PARALYSIS OF BOTH LEGS, AND PAIN IN COURSE OF THE ANTERIOR CRURAL; DEATH UPON THE TENTH DAY; BLOOD EFFUSED ROUND THE CORD, AND WITHIN THE GRAY MATTER.**

W. O.—, æt. 33, a labourer, when at work was prostrated by a weight of timber falling upon his shoulders, doubling him up. He was admitted shortly afterwards with complete loss of sensation in the course of the sciatic nerves, but no paralysis. There was severe pain across his loins, and retention of urine. Upon examining the spine some displacement of the eleventh dorsal vertebra was very evident. In a few hours sensation returned,

but both legs became paralysed. The day following, the man complained of severe pain in the course of the anterior crural nerves. In another twenty-four hours all pain ceased, and complete paraplegia and anæsthesia existed, and upon the tenth day he died.

At the post-mortem examination the eleventh dorsal vertebra was found dislocated forwards, tearing through all the ligaments and the intervertebral substance, the extreme edge of the body of the twelfth only being fractured.

Blood was extensively effused round the cord at the seat of injury, the membranes were natural, and the surface of the cord was flattened and felt soft. A section showed a pulpy condition of its structure for some distance above and below the injury; the gray matter could not be distinguished, being mixed with blood and disorganized. This condition extended downwards to the extremity of the cord, and as high as the fourth or fifth dorsal vertebra.

In this case it would appear that the cord could have received but a slight injury at the time of the accident, as the only symptom was anæsthesia in the course of the sciatic nerves, but no paralysis. At the expiration of a few hours paralysis of both legs came on, and it is fair to conclude that at this time some secondary hæmorrhage took place at the seat of injury, and probably that hæmorrhage was external to the cord. At a subsequent stage perfect paralysis of the whole lower portion of the body appeared; and the post-mortem condition of the cord revealing a distinct effusion of blood into its gray matter, causing disorganization of its structure, clearly indicated the cause.

Enough examples have been quoted to illustrate the injuries to the cord which are liable to occur in cases of fracture or dislocation of the spine, and I shall now quote one instance of fracture of the spine, unattended with any injury to the cord whatever or any spinal symptoms.

CASE XLVI.—A woman, æt. 49, in a fit of mania jumped out of window. She was subsequently admitted into the hospital with a severe contusion of the back and head, but no other signs of injury; she was able to walk and move her limbs in every direction, but was evidently maniacal; there was no retention

of urine or any single symptom of injury to the nervous centres. After a few days, when the maniacal symptoms had been subdued, she remained in bed, and became perfectly quiet. She lay still with her eyes closed for many days, but would occasionally rouse herself, and speak rationally. There was no paralysis, and she sunk upon the sixteenth day.

*Post-mortem*—by Dr. Wilks :

The calvaria was rather heavier than normal, and there was considerable subarachnoid effusion over the whole brain, lying in small pools over certain sulci. The convolutions were much wasted ; the ventricles were dilated with serum ; the surrounding parts wasted, and the septum was like a piece of tissue-paper, and diaphanous. The brain weighed only two pounds seven ounces.

*Spine*.—The last dorsal and three upper lumbar vertebræ were fractured, a fissure extending through all their bodies ; but there was no displacement. The spinous processes and arches of two of the vertebræ were fractured, and blood was effused into the soft parts around, but the cord and membranes were uninjured.

The viscera generally were fatty.

This case has been given simply to illustrate the fact that severe fracture of the spine may take place, and yet no injury to the cord itself occur ; it is interesting also to observe that the patient walked about freely, and yet never gave any symptoms of fracture. The wasted condition of the brain, associated with mania, is worthy of notice.

There would be no difficulty in giving the details of many cases of inflammation of the cord and of its membranes after injury ; such a complication may take place from the simplest blow, concussion, or any severer accident ; but it will be foreign to my purpose to enter more fully into this subject, and I can refer the reader interested in such matters to a series of papers published by Dr. Gull, in the last volumes of the 'Guy's Hospital Reports.'

## CHAPTER V.

In an early page there are tabulated 82 cases of disease of the spine ; in 16 this disease was in the cervical, and in 66 in the dorsal or lumbar region ; in the majority it appeared to be situated in the lower part of the dorsal. In one of the cervical it was complicated with abscess, and in 47 of the remainder—

In 25 examples it opened in the course of the psoas muscle ; in 9 in the right groin, and in 16 in the left.

In 20 examples the abscess was a lumbar one, and appeared about equally on both sides.

In 2 it was gluteal.

Six of these cases subsequently died, worn out by the discharge.

There are also tabulated 17 cases of spinal paralysis ; in some instances the paralysis followed injury, in others no real history could be obtained.

It is not my intention to dwell longer upon this subject. In the treatment of all the spinal cases absolute rest was essentially observed ; where signs of inflammatory action were present, mercurials, in the form of the bichloride, were given with tonics ; and where no such symptoms were manifested, tonics alone were given. The spinal abscesses were seldom opened, and only when pain was great. I have classed all the psoas, lumbar, and gluteal abscesses under the one heading of spinal abscess, as such a term better illustrates the pathology of such affections ; and to those readers who are anxious for more information upon these subjects, I must refer them to the standard works upon the subject.

# CASES

OF

## RUPTURED UTERUS DURING PARTURITION.

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BY J. BRAXTON HICKS, M.D. Lond., F.L.S., &c.

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IN describing the symptoms of rupture of uterus during parturition it seems to me desirable to divide such cases into three classes, each of which has features peculiar to itself, and evidently requiring a corresponding difference in treatment. It leads to much confusion to describe under one category all the symptoms that are observed in every case; as, for instance, to ascribe to simple laceration of the cervix the formidable symptoms to be seen in rupture of the body. For though we might also divide cases of rupture of uterus into idiopathic and traumatic, still the symptoms are much the same, however produced.

I would, therefore, propose that the *first class* include laceration of the cervix uteri, with or without a small portion of the vagina. The *second*, laceration of the body or fundus, extending through part or all the coats, and including those cases where the rent has extended from the cervix. The *third* to embrace such lacerations as have allowed part or the whole of the uterine contents to escape into the peritoneal cavity.

In the first class of cases the symptoms are generally by no means formidable, and recovery rapid and favorable, often passing off without any untoward symptom. But inasmuch as there is a strong disposition for the rent to extend into the body of the uterus, and also into the vagina during the com-

pletion of labour, it will in all cases give rise to much anxiety on the part of the attendant, and require probably the reduction of the size of the head. Another danger attending this form of laceration is hæmorrhage, as the following case will show.

M. H—, æt. 34, subject to privations, who had had previously three miscarriages, and six full-time labours, in all of which she had difficulty—two requiring the forceps—was taken in labour July 14th, 1854, at 7 p.m. About 4 o'clock p.m. on the 15th there was slight hæmorrhage, for which the attendant ruptured the membranes. It was then found to be a case of transverse presentation. The os uteri not being then sufficiently dilated, it was deemed proper to wait a little; but becoming dilatable about 2.30 on the 16th, version was readily effected, and the child easily removed alive, but hæmorrhage followed, which could not be controlled by pressure nor cold. The placenta, partially adherent, was then removed by the hand, after which the uterus contracted firmly. The bleeding, however, of an arterial character, continued in spite of all attempts to control it, and the patient sank on the morning of the 17th of July.

The necropsy revealed a rupture extending through the cervix.

The second class of cases are much more formidable, both from the shock it gives to the system, as evinced by the fainting and collapse, from the hæmorrhage that may take place into the uterus or peritoneal cavity; and from the suspension of the labour-pains, vomiting, &c. Although the sensation of tearing has frequently been noticed by the patient herself, and sometimes audible to the bystanders, yet some cases occur in which the labour has terminated by the natural efforts, and without any symptom to point out a probable rupture, till, inflammation setting in, a post-mortem examination made the condition evident. Thus this class may be divided into two sections.

- A. In which the symptoms of rupture are very apparent at the time of occurrence.



- b. In which labour is terminated by the natural powers, but slight hæmorrhage taking place. These cases may possibly be much more common than they are usually considered, a favorable recovery ensuing without any suspicion having arisen; as many undoubted cases of rupture have occurred without an untoward symptom.

There are, of course, cases intermediate between these two sections, and the following case will show that a fatal hæmorrhage into the peritoneum may go on to death, without any sensation of tearing, or without any certainty of fixing the date of rupture, except a feeling of soreness towards the umbilicus after some brisk pains and their sudden cessation, which is by no means so very unusual in natural labours.

S. S—, æt. 37, had had eight full-time labours, four of which were precipitate, and a miscarriage fourteen months before the last and fatal labour about to be described, since which she had never been well. Subject to privations, rather emaciated, flabby and pale. Was taken in labour about 4 a.m., August 25th, 1856. She fainted frequently during the morning, for which she took gin-and-water about 11 a.m. The pains began to increase in severity and frequency, and so went on for an hour, when they became nearly continuous. About 12 a.m., after two or three strong pains, they ceased suddenly, and she complained that they had shifted to the abdomen, with a feeling of soreness towards the umbilicus; excepting this, there was no marked symptom; she felt a little faint, as she had done in the morning. The pains remaining absent for half an hour, she raised herself up quickly, and on being made to lie down directly, she became deadly pale, pulse flagging, hands cold and clammy, the medical attendant and nurses fancying she was about to faint, which she did not, but collapse continued till about 2 p.m., when she died. The attendant delivered the child directly, which, however, was dead. The placenta was detached from the uterus, and its surface covered with clots of blood.

The post-mortem revealed a longitudinal rupture of about seven inches long, extending from just above the os through

all the coats of the left anterior wall. From this rent a large quantity of blood had escaped into the peritoneal cavity.

The quantity of blood and the condition of the structure of the uterine walls were not mentioned in the report of this case.

An illustration of the third class of rupture of uterus, in which the cause was from a narrow pelvis, accompanied by very violent pains, and in which gastrotomy was performed, but which was fatal in eight days, has been kindly furnished me by Dr. Fluder, of Lympington, in whose practice it occurred.

Mrs. C—, æt. about 25 years, was delivered a year and three quarters before, in her first labour, by cephalotomy, in consequence of a narrowed brim, for which she was advised, in the event of a future pregnancy, to have delivery induced prematurely. From some cause she did not assent, and went to her full time. In the last labour the pains had been progressing and the head descending, when, in a violent paroxysm of pain, she exclaimed, "It is all gone back!" The pains ceased, the foetal head receded out of reach, there were rigors, and tendency to syncope. After consultation with other medical men, the Cæsarian section was performed a few hours after the accident, and the child was found in the peritoneal cavity. Very little blood had escaped, but the rent in the uterus was plainly seen. The placenta was adherent, and peeled off from the uterus after the section, and the uterus contracted firmly after its removal, so as to effectually close the rent, which was about six or seven inches long. For four days everything went on well, but inflammation set in after that date, and she died eight days after the operation, from peritonitis.

With regard to the frequency of rupture of the uterus, I have collected from private sources, all from thoroughly good practitioners, 12,400 cases of midwifery, in which there occurred only two cases about which there was no doubt, and two in which there was uncertainty, as no post-mortem examination was made.

The cases attended by the pupils of Guy's Hospital since the last septennial report, are, to the time of writing this, 8982, in which there have only occurred two certain cases, and none

suspected. These cases give a low ratio compared with other reports. For undoubted cases, 1 in 5345 cases; including certain and uncertain, 1 only in 3563 cases. If we add to these those already published in the three septennial reports of Guy's Hospital, namely, 22,498, in which there occurred five certain cases, and five uncertain, we find a total of 43,880 cases, with nine certain cases of rupture, or 1 in 4875 cases. If we include certain and doubtful, we then have 1 in 2736 cases. This will be seen by the accompanying table.

|  |        | Undoubted. |       | Doubtful. |       |
|--|--------|------------|-------|-----------|-------|
|  |        | Cases.     | Died. | Cases.    | Died. |
| From private sources .                           | 12,400 | 2          | 2     | 2         | 2     |
| Lying-in Charity since<br>last Septl. Report . } | 8,982  | 2          | 2     | —         | —     |
| 21 Years ditto published                         | 22,498 | 5          | 5     | 5         | 4 .   |
| Total . . . . .                                  | 43,880 | 9          | 9     | 7         | 6     |

Thus it will be seen that all the undoubted cases died; and of the uncertain, six out of seven died. In only one did the contents of the uterus escape into the peritoneal cavity.

C A S E S  
OF  
MORBUS ADDISONII, MELANÆMIA,  
ANÆMIA IDIOPATHICA,  
LEUCOCYTHEMIA SPLENICA ET LYMPHATICA.

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BY SAMUEL WILKS, M.D.

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CASE OF DISEASE OF THE SUPRA-RENAL CAPSULES, OR  
MORBUS ADDISONII, WITH REMARKS (PLATES I and II).

As this form of disease has created so much attention throughout the whole medical world, we think it may interest some of our readers to lay before them the last example of the affection<sup>1</sup> which has occurred at Guy's Hospital, and to accompany it with some general remarks. It is scarcely necessary to state that the lithograph barely does justice to the appearance of the skin, since it is difficult to transmit to paper, except by a very careful water-colouring, the exact hue exhibited by nature; nevertheless we think it may assist those of our readers who are at present unacquainted with the malady in gaining some idea of the remarkable pigmental change which occurs in this disorder.

The following are the notes of the case, as furnished by Mr. Lovegrove, the reporter:

Thomas L—, æt. 32, was admitted into Guy's Hospital, under Dr. Addison, on July 2d, in an extremely debilitated

<sup>1</sup> This case has already been related in the 'Medical Times and Gazette.'

state, and died rather suddenly three days afterwards. The case was well known, as the patient had been under observation for more than two years. He lived at Walworth, and was employed as driver of a stationary engine in a seed-bleaching factory. He was first admitted into the hospital on October 10th, 1856, under Dr. Habershon, having already been an out-patient under that gentleman's care for five months previously. He stated that he had been rather a free liver, and had suffered from gonorrhœa and syphilis, and that about twelve months before (the last date), he observed that he was losing strength, and that his skin was becoming of a dark hue. He sought medical advice in consequence, and was said to have liver-disease; he also had at that time pain in his side. On admission he had a haggard, worn expression of countenance; he was of spare frame, and his skin was of a dark colour, resembling that of a mulatto, and almost black on the scrotum; the mucous membrane of lips and gums also darkened in hue. Heart feeble; pulse sixty-four, weak; chest healthy; urine natural; his eyesight was dim, and he suffered from faintness after the least exertion. The case was at once recognised as one of Addison's disease; and Dr. Habershon, in discussing what could be done for him, considering that the symptoms of asthenia were due to some loss of function of the semilunar ganglia and solar plexus (these parts being intimately connected with the supra-renal capsules), proposed the use of electricity. This was adopted, with the internal administration of iodide of potassium and bark, and the man left relieved after a few weeks. After leaving the hospital he stated that he was better, and was able to follow his employment, until three weeks before his last admission, when he took cold and became much worse. He then returned on July 2d, the present month. He stated that his strength had been good, but it was evident that he had become accustomed to an unnatural condition, for he would not admit his extreme weakness even then, although he could scarcely stand. The skin was of a dark brown colour, and of a deeper tinge at navel, nipples and scrotum; mucous membrane of gums and mouth stained with patches of a leaden hue. He had dizziness and failure of vision on attempting to walk; no appetite. He after this got still weaker, and died rather unexpectedly on the morning of the 5th of July.

More particulars might be added to the first report from the memories of those who saw this man on his first admission with respect to his feebleness, his remarkable colour, and the absence of all symptoms referable to disease of any of the larger organs of the body whose functions are better known ; but it is thought desirable not to alter the original history, although short, as it was taken a year and nine months before his death, and which, it may be remarked, is styled in the hospital books a case of "*Melasma supra-renale*." It may be mentioned that no odour was observed ; but this was not especially regarded.

*Post-mortem inspection*—taken from Dr. Wilks's report.—  
External appearance of body : Spare, but not at all wasted ; an average amount of good subintegumental fat, and also fat in usual amount in the abdomen. Muscles red, and of good size, as if they had been exercised of late. The colour of the body was most remarkable, resembling that of a mulatto or one of dark blood, and contrasting strongly with the white skin of another body which lay at its side, and which it had resembled three years before. The colour was of a slight greenish brown ; and the subject would undoubtedly have been taken for a man of colour, had not the previous history been known. The brown hue was universal, except on the lower parts of the legs, which were lighter, and was remarkably uniform, there being no darker or lighter patches on any parts, excepting two black specks on the face. The axillæ, umbilicus, and genital organs, however, were of a darker shade. No distinct patches of pigment on the lips, but the margin next the skin of a dark hue. Hair darkish, but not black ; eyes gray. Brain healthy. Pituitary body healthy. Lungs healthy. The apex of the right lung contained a dry cretaceous mass the size of a pea. This lung adherent by old cellular tissue. Heart, weight 8 oz., small ; muscle firm, red, and healthy ; a small loose coagulum on the right side ; veins full of blood. Stomach : mucous membrane highly injected, and the surface covered with tenacious mucus, as if an irritation or low form of gastritis had existed. Intestines healthy, with the exception of remarkable prominence of Peyer's patches and solitary glands at the lower end of the ileum. Mesenteric and other lymphatic glands

healthy. Liver (weight 3 lb. 5 oz.), spleen (weight 6 oz.), and pancreas, healthy. Kidneys healthy, with exception of the top of one presently to be mentioned. Supra-renal capsules: both organs quite destroyed in structure by adventitious deposit—an albuminous-cretaceous material. There appeared also to have been an inflammation of their investing capsules, as they were firmly united to the surrounding parts, and were with difficulty dissected out; thus the right was adherent to the liver and top of the kidney, and the surrounding fat could not be stripped off in the ordinary way, but being adherent the organs could only be rendered clean by scraping. The right supra-renal capsule was about the size of the healthy organ, but the left was puckered into a roundish mass about the size of a walnut. When cut through they presented the usual appearance of the disease which so frequently attacks these organs, being converted into a whitish amorphous matter, which was formerly called scrofulous. This consisted mainly of two parts—a white, brittle, cretaceous matter, and a semi-translucent, soft, dry matter, resembling a dirty-coloured blanc-mange. The latter was probably the original or primary deposit, and the former the same having undergone degeneration. The right capsule in addition was softening in its middle, and contained about a drachm of a cream-like fluid. The disease on this side had slightly encroached on the kidney, the top of which contained a soft whitish spot. The microscope showed the adventitious material to be almost structureless; the softer semi-translucent parts consisted of an amorphous substance mixed with granules; the latter, being collected in small groups, put on the appearance of cells and nuclei, and probably they were such degenerating, but no cell- or fibre-structure could be distinctly made out. The yellower friable matter consisted of little else than fatty and cretaceous granules. The white spot at the top of the kidney in contact with the right capsule contained some nuclei and nucleated fibre, and appeared to consist of a simple inflammatory product.

The semilunar ganglia appeared healthy, but their nerve-branches ran quite into the diseased capsules, and were lost in them. The skin, when a section was made, showed most admirably the position of the pigment. It was situated beneath

the epidermis, in the rete mucosum, following the course of the papillæ, and thus exactly resembling the integument of a black man.

It will be seen that the discoloration of the skin had existed for three years, and therefore it is in the highest degree probable that the man had lived for more than that period with both capsules greatly disorganized.

It is useless to pretend ignorance of the scepticism which still prevails as to the conclusions which Dr. Addison has arrived at concerning the fatal nature of disease of the supra-renal capsules, and its frequent association with discoloration of the skin; but this need occasion no surprise when we consider the novelty of the subject, and the remarkable features which are said to accompany it. Apart, however, from the legitimate doubts which ought to attend the reception of every new doctrine or observation, numerous objections have been made which are founded upon erroneous views as to the real statements of the author, and therefore we shall oppose to these a few critical remarks, and then briefly reiterate the most prominent characters of the complaint as originally laid down.

Thus, it has been said that supra-renal disease has been discovered independently of any alteration in the colour of the skin, also that a pigmental discoloration may constantly occur without any morbid affection of these organs; moreover, that they may be found diseased when the patient has died of some acute malady; and even a fourth argument is added, that they may be removed from the lower animals with impunity.

Before considering these objections, let us for a moment look at the original statements put forth by the author. And first of all remember, that the discoloration of the skin, although a striking feature of the complaint, was not the main one insisted on by him; but since it is that which can be portrayed in a drawing, and consequently apt to strike the eye on turning over the pages of the monograph, it is not surprising that it was at once regarded as the most remarkable part of the complaint, and would therefore be especially dwelt upon in our ordinary mode of communicating facts to one another, until at last the erroneous opinion would be reached that Addison's disease and discoloration of the skin were interchange-



able terms. Now, it is stated by the author himself that he was led to the discovery by a very different method than by studying the changes in the skin; that it was owing to a peculiar interest which he took in a class of cases styled simple and fatal anæmia that this allied affection came under notice, and that it was whilst watching such cases the fact of discoloration was also observed, and subsequently on post-mortem examination its connexion with disease of the supra-renal capsules. The extreme prostration of all muscular power was the most remarkable circumstance attending these cases, and indeed in some forms of supra-renal affection no discoloration had occurred at all. This was the case in the instance of a man who died in the hospital about two years ago, in whom there was no discoloration of the skin, the only symptom being the most utter prostration of strength, and yet after death these organs were found completely diseased. The most prominent symptoms, then, of the affection are due to this asthenic condition, denoted by the loss of muscular power, weakness of pulse, breathlessness upon exertion, dimness of sight, weakness of stomach, &c.; and if the case has been of long duration, in addition to these, a discoloration of the skin. A sufficient number of cases have now been observed to prove that the change in the skin depends on the chronicity of the disease. This is Dr. Addison's opinion, and the fact has been verified by Mr. Hutchinson, who has taken the trouble to collect all the cases recorded; and therefore it may be said that in the acute form of the disease no discoloration of the skin may be expected, but merely symptoms due to asthenia.

As regards the character of the colour when it occurs, the observation of several instances since the publication of the original memoir has shown that very great similarity has existed in all of them, both as regards the hue itself and its method of affecting the body by a uniform implication of the whole surface. It is true that a case is represented where the body is covered with patches of colour, checkered with white; but here no post-mortem examination took place to verify the diagnosis, and thus the fact is left as we state, that in the first-related cases, as well as in all subsequent ones, there has existed a uniform discoloration of the whole integument. So remarkable has this been, that the body has presented the

appearance of a person with dark blood rather than that of a European, and therefore the answer which Dr. Addison continually makes to interrogatories respecting the peculiarity of the discoloration is, that he regards only those cases as characteristic where the surface of the body is seen to be gradually approaching in colour that of an inhabitant of some southern nation. The similarity is proved by examination of the integument itself, which, if placed beneath the microscope, is seen to contain a layer of pigment in the rete mucosum just as in the dark races of mankind; so that no difference, as far as we are aware, can be found between them. Moreover, as in the latter, certain parts, as the axillæ and pubes, are darker than the rest of the body, so in this morbid discoloration these same parts are those most affected. Without, therefore, denying that the colour may sometimes occur in patches, we think we are correct in saying that all experience has hitherto shown that the discoloration has been uniform over the whole surface of the body. The exact hue is difficult to describe, but it may be said to resemble that of a mulatto's skin, and therefore is of a brownish cast, having sometimes an olive-green tinge, and thus the term bronzing of the skin has come into use, or it has often what our artist calls a walnut-juice shade. To say, however, in short, that the appearance produced is exactly that of a person of dark blood, is to speak as accurately as description will allow. The anatomical characters are probably not very peculiar, and resemble those of many other pigmental changes, arising from various causes, since the true seat of colouring matter is in the cells of the rete mucosum; this is its position in dark races, and also when produced by morbid conditions. An examination of a portion of skin, therefore, would not determine the nature of the case; although, if the colour should be universal, there would be a strong suspicion of supra-renal disease. It is well, however, to remember that the pigment is situated beneath the epidermis, and thus is distinguishable from pityriasis, and many other conditions with which Addison's disease has been confounded. It would seem scarcely needful to say that it is impossible to confound it with jaundice, had the mistake not been often made; indeed, in nearly all instances of the affection which have come before us an hepatic disease has been the diagnosis; but a moment's

observation would be sufficient to show that no bile is circulating through the body—the urine contains none, nor is the conjunctiva yellow, which is the first part affected in jaundice, but here, on the contrary, is remarkably pale and anæmic. It is true, however, that in jaundice the yellowness of the skin is due to a deposition of biliary pigment in the rete mucosum. A remarkable circumstance observed by Mr. Hutchinson in connexion with the discoloration is that in some instances the surface of the body has evolved a peculiar odour, resembling that perceived in dark races of mankind.

The symptoms, then, of Addison's disease are characterised by those of asthenia, and in chronic cases by discoloration of the skin. And now as regards the post-mortem appearances. These may be exclusively confined to the supra-renal capsules, and the disease affecting them is of a remarkably uniform character, differing merely according to the stage of the affection. The disease, without doubt, is closely allied to tubercle, since in several instances tubercles have been met with in the lungs and other parts of the body, or a scrofulous material in some lymphatic glands, closely resembling the deposit in the supra-renal bodies. When the disease is acute the organ is somewhat enlarged, and changed into a material which is semi-translucent, of a gray colour, softish, homogeneous, without structure, or sometimes slightly fibrillated, or contains a few abortive nuclei or cells. This lardaceous material is the first deposited, and resembles what is often seen in the early stage of scrofulous enlargement of lymphatic glands. Subsequently it undergoes a decay or degeneration, as in them, and changes into an opaque, yellowish substance, and thus the two materials are constantly found associated. At a still later period, as in a scrofulous gland, it may soften into a putty-like matter, or it may dry up, leaving the mineral part as a chalky deposit, scattered through the organs. These, then, are the changes—first, the deposition of a translucent, softish, homogeneous substance; subsequently, the degeneration of this into a yellowish-white, opaque matter; and afterwards a softening or drying up into a chalky mass. It is clear, therefore, that as the discoloration of the skin occurs only in very chronic cases, that it must have been found always associated with these later stages of the supra-renal disease, and that when the skin has been not

altered in colour, the earlier conditions have been met with; and this has been the case also in those instances where associated with general tuberculosis. Occasionally, also, some fibrous tissue may be found around the organ, being the products of an inflammation which has united them to the kidney, liver, and adjacent parts. It is not sufficiently remembered that some years are necessary for the changes to occur in the deposit of which we have spoken; and therefore, if chalky substance be found, there can be no doubt that the disease has existed for a considerable period. This corresponds with our knowledge of the duration of the symptoms in some of the best-marked cases which have come before us, and should compel us to keep under notice suspected instances of the disease for several years.

Now, to consider the objections which have been raised as to the correctness of these observations. It has been said, in the first place, that animals have survived long after removal of the supra-renal bodies; now, should this be so (although further experiments are required to corroborate the statement), it would not militate against the fact that disease of these organs will, sooner or later, lead to a fatal result, since similar arguments might be used with reference to other organs which can be removed with impunity, and yet, when subject to morbid conditions, lead to fatal consequences. For example, the spleen is said to be capable of removal without injury to the animal, and this can be well believed, seeing how extremely atrophied it often becomes in old people; and yet we know, at the same time, that when hypertrophied it is sufficient to kill. Moreover, as just now remarked, it does not seem sufficiently remembered that the disease of these organs is naturally slow, and that in all probability they are almost totally disorganized before death takes place; that, owing to some unknown cause whereby their function may be otherwise performed, or be for a time in abeyance, the patient may probably live for years, and then at last die suddenly, in a somewhat analogous way as degeneration of the kidneys may persist for many years, although the patient is always on the brink of a precipice, and ready on any day to die off unexpectedly; but in such a case the importance of the disease might be doubted if the

patient had died from other cause, and the renal affection been met with accidentally.

As regards the objection that the discoloration offers no anatomical peculiarity, since the pigment is merely deposited in its usual position, it may be answered that this is true with respect to this one fact, but not true as to the mode in which the body is affected, since we are not aware that at present any case has been brought forward where the whole cutaneous surface has been discoloured so as to resemble the mulatto in the manner mentioned other than that of supra-renal disease. Partial discolorations, as in *ephelis*, are common enough.

With respect to a third objection, that disease of these bodies may exist without discoloration, this has already been explained as a point admitted when the disease is acute.

Then as regards the accidental discovery of supra-renal disease in the body after death, when not suspected: this, we think, has no greater importance than the discovery of disease of other organs when not anticipated. If found alone it would be sufficient to indicate the mortal nature of the malady, and if associated with disease of other organs it would be difficult to say to which to attribute the symptoms; thus, a general tuberculosis, involving a large number of important parts of the body, may include the supra-renal organs as well, and in such a case there may have been no distinctive marks of the existence of their morbid condition during life, but then the same may be said with respect to all the other organs affected. Again, even should an acute disease carry off the patient, and disease of these organs be found, still (in our present limited knowledge of the subject) it cannot be said that the one affection did not predispose to the other, since in one of Dr. Addison's best-marked cases the patient died of an acute pericarditis.

All these objections which have been raised we consider to be of little value compared with the great facts which remain—that at the present time several cases are recorded where persons have died with no other apparent disease in their body than that of the supra-renal bodies, sometimes associated with discoloration of the skin and sometimes without; facts which show incontrovertibly that their disease is connected directly or indirectly with the death of the patient. Moreover, we cannot

bring our mind to conceive how, when in several of such cases a right explanation has been given as to the cause of the symptoms during months or years prior to the patient's decease, this diagnosis was due to a fortunate guess rather than to a rigid scientific deduction.

For the satisfaction of those of our readers who have not had an opportunity of perusing the original monograph, we extract the following important passages from Dr. Addison's work :

"For a long period I have from time to time met with a very remarkable form of general anæmia, occurring without any discoverable cause whatever; cases in which there had been no previous loss of blood, no exhausting diarrhœa, no chlorosis, no purpura, no renal, splenic miasmata, glandular, strumous, or malignant disease. Accordingly, in speaking of this form of anæmia in clinical lecture, I, perhaps with little propriety, applied to it the term *idiopathic*, to distinguish it from cases in which there existed more or less evidence of some of the usual causes or concomitants of the anæmic state."

"It was whilst seeking in vain to throw some additional light upon this form of anæmia, that I stumbled upon the curious facts which it is my more immediate object now to make known to the profession."

"The leading and characteristic features of the morbid state to which I would direct attention are anæmia, general languor and debility, remarkable feebleness of the heart's action, irritability of the stomach, and a peculiar change of colour in the skin occurring in connexion with a diseased condition of the supra-renal capsules."

"The patient becomes languid, weak, indisposed to either bodily or mental exertion, the appetite is impaired or entirely lost, the whites of the eyes become pearly, the pulse small and feeble, or perhaps somewhat large, but excessively soft and compressible; the body wastes, without, however, presenting the dry and shrivelled skin and extreme emaciation usually attendant on protracted malignant disease; slight pain or uneasiness is from time to time referred to the region of the stomach, and there is occasionally actually vomiting, which in one instance was both urgent and distressing, and it is by no means uncommon for the patient to manifest indications of

disturbed cerebral circulation. Notwithstanding these unequivocal signs of feeble circulation, anæmia, and general prostration, neither the most diligent inquiry nor the most careful physical examination tends to throw the slightest gleam of light upon the precise nature of the patient's malady, nor do we succeed in fixing upon any special lesion as the cause of this gradual and extraordinary constitutional change."

In cases of supra-renal disease—

"With more or less of these symptoms we discover a most remarkable, and as far as I know, characteristic, discoloration taking place in the skin; sufficiently marked, indeed, as generally to have attracted the attention of the patient himself or the patient's friends. The discoloration pervades the whole surface of the body, but is commonly most strongly manifested on the face, neck, superior extremities, penis and scrotum, and in the flexures of the axillæ and around the navel. It may be said to present a dingy or smoky appearance, or various shades of deep amber or chestnut-brown, and in one instance the skin was so universally and so deeply darkened that, but for the features, the patient might have been mistaken for a mulatto. In some cases this discoloration occurs in patches, or perhaps rather, certain parts are so much darker than others as to impart to the surface a mottled or somewhat chequered appearance."

#### MELANÆMIA AND DISCOLORATION OF THE TISSUES ARISING FROM INTERMITTENT FEVER.

The discoveries of late years by Vogel, Planer, Frerichs, and others, of a pigmental change occurring in the various organs of the body in some cases of intermittent fever, have also been brought forward as affording some explanations of the discoloration observed in Addison's disease. The observations of these physicians have shown that often in intermittent fever the blood undergoes a disintegration in the spleen, and the hæmatine from the broken-up corpuscles circulates through the system until it becomes impacted in the capillaries of the various organs of the body, and which causes them to assume a dark colour; the skin, however, presents only a yellowish hue,

so characteristic of the miasmatic affection. It is thus seen that the condition produced is very different from what occurs in Addison's disease; moreover, the symptoms of the two affections are totally unlike, being in the one connected with extreme feebleness or asthenia, while in the other the symptoms are febrile and resembling those of typhus, especially if associated with cerebral disturbance.

These observations not being generally known, and being of great interest, we think it will not displease our readers to place before them the principal facts gathered from Frerichs' work on the liver, as well as what we gained personally from the professor when on a visit to this country, last summer. It is a remarkable circumstance that Bright had observed the fact of discoloration in two cases related in his 'Medical Reports.' Although he did not connect them with intermittent fever, yet the patients having long resided in an aguish locality, and the symptoms, together with the post-mortem appearances, so exactly coinciding with similar instances related by Frerichs, no possibility of doubt can exist as to their identity. We shall therefore requote these cases as affording examples of the curious affection which we shall now briefly describe.

In Frerichs' lately published work on the liver there is a chapter entitled, "The Pigment Liver, or Melanæmic Liver." Referring to the alteration which the organ undergoes by intermittent fever, the author at the same time enters generally upon the subject of black blood caused by this disease. His principal remarks are as follow :

"There is an ancient tradition that black matter becomes collected in the portal blood of the liver and spleen, and engenders certain diseases. Many observers have already noticed black organs in those who have been long subject to intermittent fever.

"After death the *liver* is found of a steel colour, owing to the pigment accumulated in the hepatic vessels. If examined by the microscope the pigment is seen in the capillary network of the portal veins diffused or in parts; sometimes the lobules are surrounded by black lines which correspond to the interlobular veins. Sometimes the pigment may penetrate from the circumference of the lobules to their centre; occasionally met



with also in the hepatic arteries, but never in the secreting cells. The liver may be tolerably healthy or may have undergone various morbid changes of the ordinary kind. In the *spleen* similar changes may be met with, the colour of the organ being changed to a blackish brown, soft, full of blood, and may be the subject of various other morbid changes. Lymphatic glands may be the seat of like changes. The *lungs* also contain pigment in some cases, but since this is so common in these organs it is with difficulty made out. In the *brain* it is more easily recognised, since the cortical structure becomes almost of a black colour; the medullary remains unaffected except where the small vessels pass through. The *kidneys* are often the seat of an intense pigmentation. This is seen in the Malpighian bodies and in the course of the blood-vessels, more rarely in the uriniferous tubules. The *other organs* do not escape the discoloration, though they do not show it like those just named, and thus there is no very appreciable change in the skin, muscles, and mucous membranes, &c.

“It may be said, indeed, that the pigment penetrates into all the vascular organs when the disease has a certain intensity, and that it deposits itself mostly in those parts where the capillaries are the smallest. The blood then is the point of departure, and the pigment is most abundant in the vena portæ. This pigment consists of little rounded or angular bodies, conglomerated together, and of different forms, cylindriciform or branching, also cells containing black granules. The different colours observable in it are due to the stages of transformation which the hæmatine has undergone until it is changed into black matter. As regards the character of the blood itself, in this affection nothing very marked has been observed.

“*What is the origin of the pigment?*—Most observers have thought that the black matter must be engendered in the spleen, but there is no absolute proof of this, for although, no doubt, hæmatine may be changed into black pigment in this organ, we know that the same will occur outside the body. It is very probable, however, that the greater part of the pigment is formed in the spleen, then enters the vena portæ, and is arrested in the capillaries of the liver or subsequently carried into the general circulation. The reasons of this are the following: we often meet in the spleen of man and other ani-

mals cellular elements which enclose blood-globules or pigmentary matters. We find these elsewhere, especially if there has been any extravasation of blood, but nowhere so frequent as in the spleen, and in the disease under consideration this organ is the most affected. Moreover pigment is never found in other organs except also present in the liver and spleen; but from the fact of the liver having been found on one or two occasions solely affected it is still a question whether the pigment is of necessity formed always in the spleen. Knowing the metamorphosis which takes place in hæmatine, we can easily imagine, how in hyperæmia of the spleen, as occurs in intermittent fever, the arrested blood should undergo these changes, and how especially this should occur in some of these highly pernicious fevers.

*“ Consecutive lesions and symptoms.—*The destruction of so many red globules produces a state of blood resembling that of chlorosis, although no excess of white globules is discernible. The liver being the first organ into which the pigment is carried, is the first which suffers; various changes may occur in the tissue, causing gastro-intestinal hæmorrhages or dropsical effusions, or may result in atrophy of the liver. The brain is the next organ which manifests a morbid affection. The particles which have not been arrested in the liver, but got into the general circulation, and not again arrested by the lungs, pass to the brain, and there are stopped in the capillaries, especially of the cortical substance, and the extent to which this has occurred can be told by the dark colour of the organ. Sometimes, though rarely, these obstructions have given rise to minute apoplectic extravasations of blood into the tissue, and probably cause some atrophy, and thus account for the cerebral derangement. Thus there is often severe headache, vertigo, sometimes delirium, coma, and it is not rare to have paralytic and convulsive symptoms. Sometimes these cerebral disturbances constitute the principal complaint, shown by dimness of vision, singing in the ears, &c.; sometimes delirium or coma, as in typhus. The symptoms are no doubt due to the decomposing elements of the blood passing through the brain. Sydenham had already noticed that idiocy was one of the consequences of intermittent fever.<sup>1</sup> As regards the kidney, this

<sup>1</sup> The parts of Sydenham's writings to which Frerichs alludes are probably such

pigmentary deposit affects the structure and causes albumen, with accompanying symptoms. Sometimes casts have been passed containing colouring matter. In the skin the discoloration amounts generally only to an ash-gray colour, but occasionally to a brownish yellow. If blood be examined from any part of the body, pigment will be discovered in it."

The *fever* in these cases may be paroxysmal, but generally the intermission is incomplete, recovery never thoroughly occurs, and the symptoms recur over and over again; then, indeed, the disease puts on the appearance of typhus, the intermittent character is gone, and the symptoms are especially cerebral. The stages of the paroxysm are not well defined, the attacks lasting perhaps two or three days, and during these death may occur with cerebral symptoms. Cases however vary, there being those where the cerebral symptoms predominate, those where the kidney is principally affected, those where the digestive organs and liver suffer, and those where the symptoms are merely those of anæmia.

This affection is not the consequence of ordinary intermittent fevers, but is met with only in particular epidemics in some localities, as if there were some unknown special influences in the marsh poison which modify its properties or make it more intense.

We should suspect the presence of this form of disease when the skin is of a yellowish gray colour, and there are present certain febrile and local symptoms, as just mentioned, of a periodic character, and the spleen and liver are enlarged.

As an example of this form of disease, we will quote the two following cases from the second volume of Dr. Bright's 'Medical Reports.'

J. C—, a man advanced in years, was admitted into Guy's Hospital August 26th, 1829. Very little account could be obtained concerning him; from the moment he was received he was deserted by his friends, who never came again. We only

as the following: "*Multa alia sunt accidentia, quæ morbos hosce consequi solent,*" &c. "*Illud autem peculiaris quædam est, ac sui generis mania intermittentes diuturniores (quartanas præcipue) nonnumquam excipiens,*" &c. "*Miratusquæ sæpe numero sum, nullam hujus rei mentionem ab auctoribus factum fuisse quum non raro accidisse viderim.*"

learned that he had been ill a fortnight, and that his wife lay in the same state; he was so ill that he was immediately sent to his bed, making some slight effort to assist himself while going up stairs. When I saw him, about half an hour after, he lay on his left side, his knees drawn towards his body, breathing with an effort, and scarcely sensible of external objects, still, however, apparently so far sensible as to attempt to put out his tongue when repeatedly desired, and making a kind of muttering sound when spoken to, though unable to render himself intelligible. His face was rather livid, his pulse very weak, his eyes staring open. He was not paralytic, for he had drawn his limbs up, and he had some sensibility, as was evident from his drawing his limbs when slightly pinched. I conceived that he was in the last stage of fever, with great congestion in the head, and in this view of his case I was strengthened by hearing that his wife lay in nearly the same state. Warmth and stimulants, chiefly external, afforded almost the only chance of restoring the circulation. On the following day he was exactly in the same state and posture, had never spoken a word, but his limbs were more contracted, and his legs covered with a cold damp perspiration, eyes still more forcibly strained, respiration more laborious, countenance more livid, and he passed his fæces and urine entirely in bed. He died in the evening.

On investigating the history of this poor man afterwards, it appeared that he and his wife left Horncastle, where they resided and where he carried on the trade of a coachsmith, and set off with an intention of walking to London, taking Northampton in the way, that they were about a week on the road to Northampton, and they stayed with their daughter a week, whence in her company they set forward to London and arrived in about one week more. They seldom walked above twelve or twenty miles in the day, and as they rested comfortably at night, it was hoped they would not suffer from the journey. However, on their arrival in London, in the middle of the night, they seemed greatly exhausted, and from that time their last and fatal illness was manifest. They arrived on Friday, the 21st of August. The man was evidently the most affected, and when seen by Mr. Palmer was considered to be labouring under fever; he gradually became worse and worse,

and was scarcely able to express anything for a day or two before he was brought to Guy's.

*Sectio cadaveris.*—The face was not now remarkably livid. On raising the cranium the dura mater did not appear unnatural, but when it was removed the cineritious matter, coming into view beneath the arachnoid, presented the most singularly marked character of venous congestion. It was almost of the colour of black lead, the large vessels not very remarkably distended, but the whole of the minute circulation of the cineritious substance so loaded with venous blood as to give one general purple gray colour (see plate). Cutting off the upper slice, all the cineritious substance presented itself of the same colour (see plate), but four distinct layers could in many parts be perceived, the outside lighter, but so thin that it might only have been the effect of transmitted light; next a very dark line, then a light layer, then a narrow dark layer, not so dark as the second, then another light and dark one within. These successive lines, though they were shaded into each other, were quite distinct in different parts when the cut was perpendicular; otherwise the dark or the light bore a greater proportion, according as the slanting cut displayed the one or the other. The outer dark part occupied about one half of the whole thickness of the cineritious portion, while the other half was composed of two light and two dark layers.<sup>1</sup> Careful examination with the microscope did not explain the cause of the dark colour of the cineritious matter, although the vessels were to be seen with unusual distinctness, passing from the pia mater through the cineritious substance. Some few of these vessels went completely through, and could be traced a quarter of an inch into the medullary substance, while others passed just through the cineritious part; but still more seemed to be broken or cut off before passing quite through, perhaps depending on the section. The medullary matter was not mottled, but of a uniform dead gray-white colour, with a few small venous specks, and on minute examination with a lens the gray colour appeared to be given by innumerable fine gray specks and short hair-like vessels, resembling the appearance produced by scraping the nap of fine cloth upon a sheet of

<sup>1</sup> These, no doubt, were the ordinary layers of the cineritious substance, rendered more distinct by the presence of unequal amounts of pigment.

white paper (see plate). The corpora striata were of the same dark colour as the rest of the cineritious substance, and the white fibres showed themselves most beautifully by their contrast. The choroid plexus was absolutely void of blood, and the large vessel which runs along its edge quite empty. At the basis the same most peculiar colour showed itself, and the basilar and other large arteries were full of black blood. No serum beyond the most customary quantity was effused either under the arachnoid or into the ventricles.

The lungs were perfectly healthy, with the exception of emphysema, which was well marked in every part, so that the lungs scarcely collapsed on admission of air into the cavity, and scarcely seemed to contain any blood. The heart natural, but the vessels ramifying over the commencement of the aorta were large and purple. The liver soft and dark. The spleen very dark, and so soft as to break down into a semi-solid mass as an attempt was made to draw it out. The intestines, except that they were congested, were natural, as were the kidneys.

*The wife's case.*—With regard to the woman, the wife of the last patient, whose age was about 66, she remained under the care of Mr. Palmer, having an unconquerable dislike to an hospital. There was sordes about the teeth, a dry brown tongue, and he considered her disease to be low fever. She remained sensible, though occasionally lethargic, till Saturday, the 29th, on the morning of which day she was considered to be even improving, but on that evening became almost comatose, and died in that state at 10 o'clock on Sunday night, the 30th.

*Sectio cadaveris.*—About sixty-five hours after death we obtained permission to examine the head; the body at that time was becoming a little discoloured by putrefaction. On raising the cranium there was no evidence of commencing decomposition to be perceived, but the brain was rather soft. The colour of the cineritious substance was peculiarly dark, though less so than in the husband; it was, however, evident that a similar condition existed in some degree, and the substance of the brain was of a gray colour from the same cause—a great multiplicity of small dark-coloured points, only to be discovered by the aid of a lens. It must, however, be borne in mind

that the appearances in this case were rendered equivocal from the possibility of decomposition, but in the case of the husband no such source of doubt existed, as the examination took place within twelve hours of his decease.

#### SIMPLE OR IDIOPATHIC ANÆMIA.

This remarkable form of disease, to which allusion is made by Dr. Addison in the above-mentioned quotation, has already received some notice in the present work, and several examples of it have been detailed.<sup>1</sup> It possesses, however, so much interest, that we think it will not be unsuitable to place another case which has subsequently occurred in juxtaposition with the supra-renal affection of which we have been speaking.

CASE.—A. W—, æt. 46, was admitted, under Dr. Barlow, December 21st, 1858; a single woman, living at Limehouse. Temperate; never had rheumatism. Three years before, the catamenia ceased, and since this time her health had been failing; having become feeble and anæmic; her legs have swollen at times, and she had been subject to diarrhœa.

On admission she was so feeble as to be obliged to keep her bed, her skin was quite pallid, and all other signs of extreme anæmia were present, as œdema of face and ankles, and breathlessness on exertion. She had much the appearance of a person with renal disease, but the urine was not albuminous. There was a cardiac bruit. She continued in the same state for seven weeks until her death, the almost bloodless condition being even more marked.

*Post-mortem examination.*—The body was very pale and slightly dropsical in all parts, the legs being most swollen, then the face and neck, and elsewhere the skin slightly œdematous. The body presented much the appearance of one dead of Bright's disease. The *lungs* were œdematous throughout. *Heart* showed fatty degeneration of that kind where the internal surface is seen streaked by a number of white lines. The fat externally was but slight. The heart contained only a very small loose pink clot on right side. The *liver* contained

<sup>1</sup> 'Guy's Hospital Reports,' Series 3, vol. iii.

a slight excess of fat. The spleen was healthy. The *kidneys* pale, but healthy, &c.

ANÆMIA ACCOMPANYING ENLARGEMENT OF LYMPHATIC GLANDS  
AND SPLEEN.

This subject has also been already treated of in this work,<sup>1</sup> and therefore at the present time we shall merely relate the particulars of one or two cases which have occurred since those last published, in order to have before us at one glance a certain class of diseases which bear a relationship to one another. In the article referred to it is stated that Dr. Hodgkin,<sup>2</sup> several years ago, remarked a peculiar form of disease, denoted by a great enlargement of the lymphatic glands, causing a slow death by anæmia and dropsy; at the same time the spleen is enlarged with some adventitious deposit. This form of disease is characterised by an almost bloodless condition, the patient being perfectly white or blanched, while his blood resembles pink-coloured water, and at the same time a serous exudation occurs into all the tissues. Although it has been stated that leucocythemia, or an excess of white corpuscles, exists in this affection, we have never been able to discover it, and never indeed in any other case than that of hypertrophied spleen. There appears, however, to be some connexion between these organs, for in the case of enlargement of the lymphatic glands not only is there generally some deposit in the spleen, but in some cases of splenic hypertrophy the glands are also enlarged. As a rule, however, we think the two affections are distinct, and that only in the affection of the spleen is the excess of white corpuscles discoverable. We think it highly probable that the distinctions are to be founded upon the difference of conditions employed under the term enlargement; that in the case of hypertrophy of the spleen, where the lymphatic glands are also

<sup>1</sup> Series 3, vol. ii.

<sup>2</sup> It is unfortunate that Dr. Hodgkin did not give a distinctive name to this form of disease, since, although it is now more than thirty years since he described it, it is still unrecognised, or if met with is regarded as a new affection. Subsequent to writing this paper we met with (in a July number of the 'Medical Times') a case of the kind related by Wunderlich, in the 'Archiv für Physiol. Heilk. ;' and in reference to it the Professor remarks "that the change observed in the spleen is, as far as the author is aware, peculiar, and hitherto undescribed."



affected (which, however, is the exception), that these are also hypertrophied, while in the essentially lymphatic disease the glands are enlarged by the same adventitious tissue, which also involves the spleen. If this be so, two very opposite conditions would be comprised under the term enlargement—an hypertrophy with increase of function, and a destruction with loss of function. In the case of the lymphatic enlargement the pallor and debility of the patient is excessive, and the blood is of a pinkish, watery colour. In hypertrophy of the spleen, although the white corpuscles are so much in excess, the patient does not present this anæmia, and his face is not expressive of any serious illness, of none, at least, commensurate with the statement of the feeling of feebleness and the necessity of lying in bed; at the same time there is considerable wasting of the body, and there is a disposition to hæmorrhage, especially epistaxis, and in some cases to purpura of the skin. Owing to the great enlargement of the organ and possible adhesions, there is often much tenderness or pain in the abdomen. The organ itself, when examined after death, appears to be simply hypertrophied, showing no change of structure or adventitious deposit. As regards the cause of this disease, we can offer no explanation, but from our own experience we should say that it is unconnected with any miasmatic influence, for it will be seen that in the three cases which follow that two of the patients came from localities where ague was unknown, and that the third, although residing in a suspicious district, denied any knowledge of intermittent fever.<sup>1</sup> It would be desirable, however, to learn from those gentlemen who practise in aguish localities what are the structural changes, if any, which occur in the abdominal organs in those who have long been subject to a malarious poison. From hospital experience the ague-ache is simply a congestion, and which is removed by change of air and medical treatment.

We would then have it understood that, although, as in the first case, there may sometimes be enlargement of the lymphatic glands, with hypertrophy of the spleen, yet as a rule, the two affections which head this article are distinct. That hyper-

<sup>1</sup> See also cases before described in Series 3, vol. i. In the last case, which is reported since these remarks were in type, there was a more definite history of aguish influence.

trophy of the spleen with leucocythemia is one disease, and that enlargement of the glands with deposit in the spleen, and accompanied by simple anæmia, is another; that in the latter affection the true splenic structure is not hypertrophied, but merely the corpuscles, which hold some close relation to lymphatics, are enlarged by deposit.

*CASE I.—Enlarged spleen and lymphatic glands. Leucocythemia.*

J. L—, æt. 63, admitted under Dr. Addison, March 30th, 1859. He was a tailor from Shrewsbury, where he had resided many years. He was in good health until June, 1858, when he had a severe attack of diarrhœa, and otherwise began to fail in health. He soon afterwards found that he had a tumour in the abdomen; during the following months he did not regain his strength, and therefore came to London for relief. On admission he was seen to be a fine, tall man, but he was exceedingly anæmic; his legs were slightly œdematous; his abdomen also contained some fluid, and on the left side there was a splenic tumour reaching below the umbilicus, and as far as the mesian line; no *bruit de souffle* could be heard in it. He had no purpura, but he stated that he had had blue spots on his arms. Some enlarged lymphatic glands could be felt in the axillæ. The blood was examined, and found to contain an equal number of white corpuscles as red; indeed, from the red coagulating in masses, the white actually appeared in excess. He was ordered Quinæ disulph., gr. iv, quartis horis. Under this treatment the man's health improved, and he was able to walk about, and the spleen even appeared reduced in size. After continuing this until May 4th, the medicine was changed for bromide of potassium, and this he was taking until his death, which occurred rather suddenly, from a rapid œdema of the lungs.

*Post-mortem examination.*—The blood was again examined, and found in the same state as during life, containing an equal proportion of red and white corpuscles. A general serous exudation into all parts. The blood in heart pink-coloured, and of a watery character. The spleen weighed 4 lbs. 14 oz.; it was firm, and, when cut, presented an ordinary appearance, excepting that some of the corpuscles were larger than usual, and the microscope failed to discover any abnormal consti-

tuments, and thus the enlargement appeared due to a simple hypertrophy. The lymphatic glands in the lumbar region were much enlarged, and there were also some similar enlargements in mediastinum and axillæ; these also appeared to be simply hypertrophied.

CASE II.—*Leucocythemia splenica.*

J. P—, æt. 44, admitted under Dr. Wilks's care September 2d, 1857, for enlarged spleen. She had come from the country on purpose to seek advice in London; her native place was Walford, four miles from Ross, in Herefordshire, a locality where ague is unknown. She was a married woman, without family; she had had an ulcerated leg for fourteen years, which prevented her working hard, but otherwise her health had been good. During the last year she had found her health failing, and this she attributed to her time of life, menstruation having become irregular, the flow having been too frequent and abundant; during the last few months this might have been called menorrhagia. She stated, also, that marks like bruises had often appeared on her legs (purpura), and that she had had frequent epistaxis. About eight months ago she began to experience pain in the left side; and after the expiration of four months she discovered that her abdomen was swollen, and this had gradually increased since. For this she came to London.

On admission the woman did not look very ill, although she said she was too weak to rise from her bed; her face did not express the existence of any severe complaint, and she was not very anæmic. She was not emaciated, though spare, having considerably fallen away in flesh. Her only complaint was weakness, and a sense of pain in the left side; there was no purpura about her. Her ulcerated leg was now scabbed over. The abdomen was much enlarged by the spleen, which appeared to occupy half of it; it had a straight edge running down the median line, and reached to the pelvis, and its surface flat and smooth. The arm was pricked and the blood placed under the microscope, when it was found to contain white and red corpuscles in nearly equal proportions. The blood was subsequently examined, and found in the same condition; indeed,

from the red corpuscles coagulating or collecting together in masses, while the white remained free, the latter appeared often to be greatly in excess.

She remained in the hospital a month, and during this time took quinine, bromide of potassium, and rubbed in the iodide ointment, but all without any effect. She then returned home. Subsequently a letter was received from Mr. Jones, of Ross, to say that she died at the end of November, the tumour having remained much the same size. He made a post-mortem examination, and found no disease except this enlargement of the spleen. He did not weigh the organ, but judged its weight about eight pounds, and the structure appeared natural.

CASE III.—*Leucocythemia splenica.*

M. P—, æt. 42, admitted under Dr. Wilks's care, on June 22d, 1859. She was a married woman, living at Brompton, near Chatham. She stated that she had never had ague, but, upon being closely questioned, she said that during her present illness she had had shivering on one or two occasions; besides this no symptom could be elicited indicative of any miasmatic poison in the system. Her illness commenced about six months before, with a general debility and dragging pain in the abdomen; this had so much increased that it was with some difficulty she accomplished the journey to London; she has also got thinner, and on several occasions has had bleeding from the nose.

On admission she did not look very ill, judging from her expression, for some colour still remained in the face; her limbs, however, were wasted, and she felt great exhaustion and shortness of breath on the slightest exertion, so that she was obliged to keep her bed. The abdomen was very much enlarged by a tumour, evidently the spleen, occupying its left half; this extended from the hypochondriac region to the pubes, and also beyond the median line; where, just above the umbilicus, a deep notch corresponding to the hilus could be felt. The surface was smooth, and, on applying the ear, a *frottement* was audible from its movement against the abdominal wall; no blood *souffle* could be perceived. There was a slight *bruit* with the systole of the heart; pulse feeble, and 85.

Urine healthy; menstruation regular, also bowels. She complained merely of weakness, badness of appetite, and an uneasy dragging pain in the abdomen. The blood was examined, and showed an equal amount of white corpuscles with the red. Owing to the slight suspicion of ague, quinine was ordered, and, at the same time, wine and good living.

July 30th.—She left her bed for a short time, and then had an attack of epistaxis.

June 2d.—Dr. Wilks, not thinking that quinine would have any effect in reducing a structural enlargement of the spleen, ordered

Potass. Bromid., gr. j;  
Sp. Amm. Arom., ℥xx; ex  
Inf. Columbæ, ter die.

She again took to her bed, and on July 8th had had two more attacks of hæmorrhage from the nose.

Not much hope being given her of a cure being effected, she returned home.

#### CASE IV.—*Leucocythemia splenica.*

The subject of the present case is still in the hospital. Israel M—, æt. 20, residing at Newhaven, in Sussex, where he was born. He thinks he had ague about seven or eight years ago, and about that time he commenced his present employment on the pier. He thinks his health has been failing for more than two years, for it was about that time that he first perceived a swelling in his abdomen. This has gradually increased in size, and his strength has failed, so that he has not been able to do much work of late. He has got thinner, and been much troubled with bleeding at the nose. He is quite a boy for his age; has at present a sallow, sun-burnt appearance, his limbs small and abdomen large; the latter contains an immensely hypertrophied spleen, more than filling its left half, and the hilus very perceptible. Epistaxis has already occurred. The blood taken from the arm presents the usual appearance, the white corpuscles apparently occupying nearly all the field of the microscope.

**CASE V.**—*Enlargement of lymphatic glands, with deposit in spleen, liver, and kidneys.*

Henry S—, æt. 18, admitted under Dr. Pavy, March 24th, 1859. He had been a soldier, invalided home, and during the last year been living at Woolwich, with symptoms of the present complaint. On admission he was in an extreme state of exhaustion and anæmia; he was perfectly white, and generally dropsical, as in Bright's disease. The urine, however, was not albuminous. An immense mass of enlarged glands existed in the neck, and the spleen was felt enlarged, thus indicating the nature of the complaint. The blood, as examined by the clinical clerk, was said not to contain any marked excess of white corpuscles. He lived only three weeks after admission, and was in such a state of utter debility that he could never rise from his bed.

*Post-mortem examination.*—Body universally dropsical, both externally and internally; all the serous cavities containing fluid, and the lungs œdematous. The lymphatic glands throughout the body were immensely enlarged, commencing at the neck and proceeding down to the lumbar region. Some of those in the neck were as large as eggs, and these were continuous with similar enlargements in the mediastinum, both anterior and posterior, especially the latter, where they joined on with similar ones in the abdomen; the inguinal were not affected. All these glands were easily separable from one another, showing that no inflammatory action had taken place between them. When cut through they appeared translucent and soft, but were really very tough, and, when examined, found to consist of nucleated fibre, and all trace of gland-structure gone. The liver, on careful examination, was seen to contain a number of minute specks, which showed by the microscope nucleated fibre, as in the glands. The spleen was much enlarged, weighing 2 lbs. 9 oz., and occupied by a number of white deposits scattered through it, which consisted also of the same material. The kidneys also, by the microscope, showed some similar deposit. The heart showed, in its interior, some white transverse lines of fatty degeneration. No tubercle in any part of the body.

**CASE VI. — Enlargement of lymphatic glands, and deposit in spleen.***(Reported by Mr. HUGH BENNETT.)*

William B—. æt. 27, admitted under Dr. Pavy, June 8th, 1859, and died July 10th. He was almost literally in a state of anæmia, his skin being perfectly white, and his prostration and feebleness extreme. He was breathless on any movement, his pulse was compressible and 92, and there was a disposition to universal dropsy, his legs being swollen and face slightly œdematous, as in severe Bright's disease, but the urine was healthy. He made no complaints, except of this excessive debility. In the left groin there was a cluster of enlarged glands about the size of the fist. The spleen also could be felt in the left hypochondriac region.

He was a single man, a gunmaker by trade, working in Oxford Street, but living in the City. He stated that his illness commenced with the enlargement of the inguinal glands three years and a half before, and he did not attribute this to syphilis, since, although he had had a chancre six months previously, it was not followed by bubo. Although the glands continued to get larger, his health remained tolerably good, with the exception of occasional œdema of the left leg. He thus continued until about a twelvemonth before admission, when, the glands being very large, he went into St. George's Hospital, under the care of Mr. Cæsar Hawkins, where iodine was applied externally, and iodide of potassium, liquor potassæ, and cod-liver oil were administered internally. Under this treatment the glands became somewhat smaller, and he left in January, and resumed his employment. He was so weak, however, that he was obliged to desist in the month of March, and in June he came to Guy's in the almost bloodless condition described. It was then clear what was the nature of the case, and that he was suffering from lymphatic anæmia. He daily grew weaker, in spite of various treatment, and at last had some cough, with fetid expectoration.

*Post-mortem examination.*—Body resembling the appearance presented by Bright's disease, very white, and universally, though not excessively, dropsical. On opening it there was also seen serous exudation into all the cavities of the body, pleura,

pericardium, peritoneum, &c. No coagulum could be found in any part, excepting a very small loose clot in the left ventricle ; the other cavities and vessels contained merely a pink-coloured watery fluid, not at all resembling blood in its outward appearance. The microscope showed nothing remarkable ; no marked excess of white corpuscles, but apparently a great diminution of red corpuscles ; these not collected in masses, but of irregular shape, and broken up, and some containing granules ; this, however, might have happened from changes outside the body. The heart itself was healthy ; the lungs cedematous, with slight lobular pneumonia ; liver and kidneys healthy ; the *spleen* enlarged, weighing 25 ounces. It was firm, and, on cutting it through, was seen to be filled with a number of white masses in all parts, so that at least half of its substance was occupied with this adventitious material. This was in pieces about the size of peas, and looked as if the spleen were filled with suet. They appeared to correspond to the Malpighian bodies, and were in different stages of formation ; thus, some were translucent and soft, and consisting, microscopically, of cells, with a few nucleated fibres, while others consisted of yellow softer masses, consisting of the same material undergoing decay ; the splenic tissue itself appeared in normal quantity and healthy. *Lymphatic glands* enlarged in various parts of the body, but not to the extent sometimes seen. Thus, the lumbar glands formed a large tumour on the spine, and the lymphatic glands about stomach, spleen, and liver, also similarly enlarged. The mesenteric were unaffected. The glands in the mediastinum were also enlarged, and a large mass existed in the left groin. The glands were of various consistence, some being softish and translucent, and, examined microscopically, appeared to be simply hypertrophied, judging from a cell-structure, which was not distinguishable from the true tissue ; others consisted of a firmer substance, which was fibrous tissue, and others contained decaying material.

*Note.*—The case of Addison's disease related at a preceding page is said to be the last which has occurred at Guy's Hospital. While this paper is going through the press, however, another case has been admitted under the care of Dr. Pavy. The patient, a young woman, was in an extreme state of de-



bility, and discoloured in many parts of the body, so that the diagnosis of supra-renal disease was at once made; and the patient dying in a few days, this was confirmed by finding these organs totally disorganized, and not a trace of disease in any other part of the body.

Besides this case, we have had the opportunity of seeing the diseased capsules from two other cases which have lately occurred to practitioners in the country, and accounts of which have been published elsewhere; one by Dr. Glover, in the August number of the 'Edinburgh Journal,' and the other by Mr. G. Mackenzie Bacon, in the 'Medical Times' for August 6th. The occurrence of these three characteristic cases since the remarks in the text were penned cannot but entirely confirm the very confident expressions of opinion therein stated as to the undoubted existence of such a disease as *Morbus Addisonii*.

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## DESCRIPTION OF PLATES.

### PLATE I

Represents the face of a man affected with *melasma supra-renal*e, or the bronzed skin of Addison's disease.

### PLATE II

Represents the diseased supra-renal capsule in its position upon the kidney.

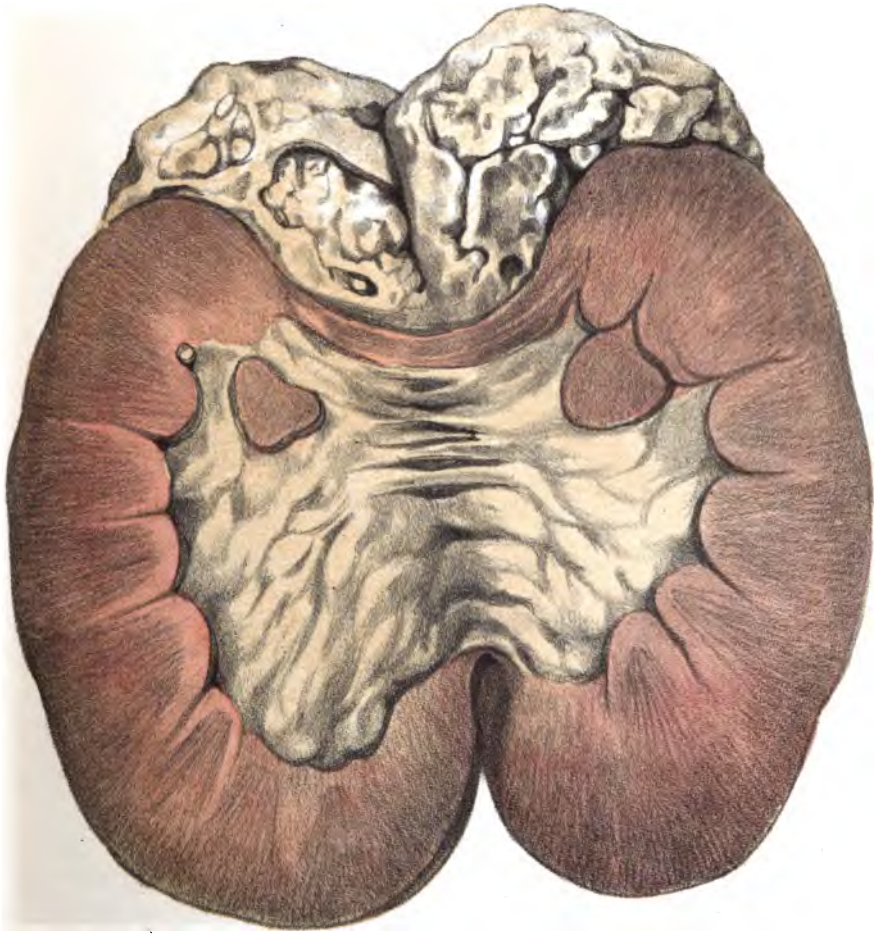


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Plate II.



*D. W. F. 1880*



# SANGUINEOUS MENINGEAL EFFUSION

(APOPLEXY);

SPONTANEOUS AND FROM INJURY.

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By SAMUEL WILKS, M.D.

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Of all the difficult cases admitted into hospitals those are the most perplexing where the patients are brought in in an insensible condition, and unable to give any account of themselves. A man, for example, may be picked up in the street, or carried from a neighbouring public-house, or place of low resort, and the surgeon has to choose between injury, poison, or disease, as a cause of his insensibility, and then again to elect between the probable forms of these. In such cases, however, even should an unfortunate diagnosis be made, and accompanied by erroneous treatment, and followed even by death, the post-mortem examination will generally enable us to determine the nature of the case for the purposes of justice. Occasionally, however, even this is difficult or impossible, and the inspection after death will throw only a partial light upon it. We refer in the present article especially to cases where an effusion of blood is found on the surface of the brain, without any apparent injury to the organ, and the question arises as to whether the cause be a blow, or arise from disease, and more particularly if the person has been known to have fallen and struck his head. Of course, in the large majority of cases, both of injury or disease, there is no difficulty in coming to a conclusion as to the nature of the case, for in the former the external parts, as the skull, membranes, surface of brain, are affected, while in the latter the mischief is within; it is in

the case of meningeal effusion, where both causes mentioned may produce the same effect, that the difficulty exists. We therefore relate some cases where the effusion was spontaneous; others where it arose from a blow; and then, again, some where the cause was dubious. In most instances where a severe injury has been received the structure of the brain is found bruised, sufficiently indicative of the cause of the extravasation of blood; whereas in meningeal apoplexy the source of the hæmorrhage is supposed to be a vein of the pia mater, although it is possible that in some cases the blood may have flowed from a large arterial trunk. It is remarkable that in the doubtful cases disease of the blood-vessels existed, and just that condition of system in which hæmorrhage is most liable to occur, and therefore, although a blow was very probably the immediate cause of the rupture of a vessel, yet the predisposition was present in the fact of the artery being diseased. In such cases we cannot possibly see how the inspection could guide us to the proximate cause; and we cannot, moreover, see how the symptoms of two conditions exactly similar can lead us in the right path, for such symptoms as convulsions (which are supposed to denote laceration of the cerebral structure) would not be present, or a paralysis due to the pressure of a very large effusion might occur in one case as well as another.

CASE I.—*Meningeal apoplexy. Bright's disease.*

Richard D—, æt. 32, admitted under Dr. Habershon, on February 25th, 1857, and died March 1st. He was a potman, and very intemperate, and so impaired was his health that he had been quite unfit for anything for some months. He was taken in for Bright's disease, and was in a half-conscious condition; he subsequently fell into a state of coma, and had several convulsive attacks. There was nothing in the symptoms to lead to the suspicion that they were due to any other cause than uræmic poisoning.

*Post-mortem examination.*—On removing the dura mater a thin clot of blood was seen spread out over the anterior lobe of the right hemisphere. This was quite recent, and could not have been effused many hours, as no chemical changes had yet occurred in it. From its position it was thought that the

source of the blood must have been one of the pia mater veins running into the longitudinal sinus. The kidneys extremely degenerated.

CASE II.—*Meningeal apoplexy. Bright's disease.*

Joseph B—, æt. 69, under Dr. Addison, February, 1858, suffering from Bright's disease. He fell into a comatose state, and died in three days.

*Post-mortem examination.*—Surface of brain healthy, but on both sides some blood was seen beneath the arachnoid, and on removing the organ a large amount was seen at the base, covering the optic commissures, pons varolii, medulla oblongata, and passing down the spine. The blood was almost entirely beneath the arachnoid, except in one or two spots where it had broken through. On opening the ventricles they were found filled with red-coloured fluid, and a small coagulum at the bottom; this was connected with a similar coagulum in the third and fourth ventricles, which also joined the clot at the base. The surface of the ventricles was quite sound, and had not been the source of the blood, nor any part of the substance of the cerebrum; whence it appeared as if the blood had been originally effused on the surface, and had subsequently passed by the fourth into the lateral ventricles. No breach of surface, however, could be detected, and no laceration of blood-vessel. The cerebral arteries were not much diseased, but the aorta was very much affected. Kidneys granular, and much diseased.

CASE III.—*Effusion of blood on surface of brain in case of anæmia.*

Mary B—, æt. 31, died of that peculiar form of affection which is styled idiopathic, or fatal anæmia. She had been slowly sinking into a state resembling chlorosis, and was admitted in the utmost condition of feebleness and prostration, and thus she remained until death. There was a fatty state of the heart, and other organs which need not be particularised. On removing the dura mater the surface of the brain was seen to be spotted with ecchymoses of blood, and in some places with actual extravasations. The inner surface of dura mater had



patches of coagulum upon it, and in the middle fossa on the right side there was a thin free layer of blood in the cavity of the arachnoid, and on anterior fossa on left side there was a similar condition. No source for the hæmorrhage was discoverable, and there was no purpuric condition existing during life, or found after death, in other organs.

CASE IV.—*Effusion of blood from injury. Death in twenty-five days.*

A. W—, æt. 25, was admitted under Mr. Cock's care, on October 24th, and died November 15th. Three days before, on the 21st, while in a state of intoxication, he was thrown down in a scuffle, and struck his head against the pavement. He was taken up insensible, and carried to a neighbouring hospital, where the wound was dressed and the man sent home. Although he then partially recovered his senses, he remained in a half-stupid state during the following day, and in the evening he had a fit, which was called epileptic. On the morning of the 23d he had another fit, and on the 24th he was sent to Guy's Hospital.

When admitted he was in a state resembling that of concussion; a scalp-wound existed on the left side of the head towards the back part. In the evening he became restless, and had symptoms like those of delirium tremens; opium was therefore ordered by the dresser.

On the 25th he was quiet all day, but in the night he was seized with another epileptic fit, which lasted a quarter of an hour, and left him in a state almost maniacal, after which he sank into a half-comatose state.

On the 26th he had three more fits, which lasted some hours, and the left side was more convulsed than the right.

On the 28th he was a little roused from his lethargic state, and appeared better again all day, but still with symptoms like those of delirium tremens.

On the 30th he was still very restless, and had no rest at night. There was now a good deal of febrile action present; the tongue was furred, &c., and the man was very low.

He after this gradually sank into a half-comatose state, and occasionally screaming out. The pupils became finally con-

tracted, and the sphincters paralysed, and on November 15th he died.

*Post-mortem inspection.*—There was a dry, scabbing wound on the left side of the head, over posterior part of parietal bone, but no injury to the bone itself. On removing calvaria, dura mater observed to be healthy, but immediately beneath it a layer of blood was found covering the hemisphere on the right side, and this was almost an inch in thickness ; it existed more on the anterior and lateral parts towards the base. The clot was shreddy, of a dull-red colour, and in some parts of a yellow or ochrey colour, showing from the changes in the hæmatine that the blood had been effused for a considerable time. On two portions of the base this yellow clot was closely adherent to the cerebral structure, and on removing it the latter was found to be bruised and soft. It was thus tolerably clear that the source of the hæmorrhage had been from some ruptured vessels of pia mater at this spot. None of the larger arteries or venous sinuses were found injured. There were no inflammatory products found in any part of the brain.

*CASE V.—Effusion of blood from injury. Death in twelve days.*

A. G—, æt. 18, was admitted under Dr. Barlow, July 17th, 1856, and he died on the following morning. Owing to the nature of the case very little history was procurable, but it was discovered that on the 6th of the month he was fighting in a barge with some men, when he received a blow on the head. He did not suffer much in consequence, and continued his employment during the next ten days, but on the eleventh day, finding his head ache, he came to the hospital. He walked up to his ward, and appeared quite rational, his only complaint being pain at the back of the head. There could be little doubt that he had been very ill, but wished to conceal his condition, for he was then very depressed, and had much febrile disturbance. Without any fresh symptoms which were observable, he died in the night.

*Post-mortem examination.*—Body, that of a strong, muscular young man ; his hands and arms were much discoloured by

bruising, as if he had been engaged in a fight. The head presented no external signs of injury, and the bones were not fractured. On removing the calvaria, the *dura mater* was of a dark colour on the right side, and was flaccid; on lifting this up, its inner surface, as well as that of brain, was seen covered with blood, being contained, in fact, in the cavity of the arachnoid. The blood was fluid, or in form of loose coagulum, and flowed out into a measure until about four ounces were collected, though there still remained some clots adherent to the membranes. The whole of the right half of the brain was surrounded by the effused blood, and which had evidently compressed it; this was seen by the septum of the ventricles being pushed over to the left side. The blood had passed down to the base, and somewhat flattened the pons varolii. The left hemisphere was unaffected; there were no inflammatory products to be seen by the naked eye. The brain itself was carefully washed and examined, in order to discover any breach of surface as a source of the hæmorrhage, but none could be found; the brain-substance also was healthy, as well as the ventricles. No laceration could be found in the sinuses or meningeal vessels from which the blood could have flowed. On the falx major there was a small bony deposit, but not in a position to affect the brain.

As regards the *effused blood*, that which was fluid and existed as a loose coagulum fell from the surface, and this appeared of a slightly brown hue, as if not quite recent, or as if some old blood was mixed with it. When this was removed there were found adherent to the brain and *dura mater* some thin layers of coagulum of an ochrey colour, showing that the blood had been present for some days; most of this could be washed off by a stream of water, still leaving, however, one or two firmly adherent patches on the *dura mater*; these could be stripped off as thin membranous layers, and when examined by the microscope showed a fibrillated texture, and also numerous cells and granule-masses; so that probably some inflammatory material was here mixed with the blood. No crystals of hæmatoidin were discoverable in any part. All the other organs in the body were healthy.

CASE VI.—*Sanguineous effusion from blow.*

J. C.—æ. 54, admitted under Mr. Cock, on December 4th, 1858. It was stated that on the evening before he was intoxicated, and fell down stairs; but it was not known that he had injured himself. He was placed in bed, and remained insensible during the whole night, so that on the following morning he was brought to the hospital. He was then in a perfectly comatose state, and no especial paralysis discoverable. He died in a few hours.

*Post-mortem examination.*—Beneath the scalp, on the back of the head, there was a thin layer of blood, such as produced by a recent blow. On examining the cranium no fracture was found, but the lambdoidal suture was gaping, and contained some effused blood. No blood was found upon the dura mater, but on turning up this membrane a large quantity was found effused on the surface of the brain; the right hemisphere was covered, as well as the base of the brain, but on the left side there was a less amount. The blood proceeded from the right anterior lobe, which was quite soft, and contained a clot. The corpus striatum was involved on its anterior surface, and the ventricles were healthy. On the floor of the middle lobe was a small spot of ecchymosis. The arteries contained some ætheroma, but were otherwise not much diseased. Liver very fatty, and kidneys granular.

The case was sent to the hospital as one of apoplexy, and there was nothing to contra-indicate it in the symptoms, and no suspicion that it had resulted from injury until the post-mortem examination was made.

CASE VII.—*Sanguineous effusion. Cause doubtful.*

J. M.—, æ. 46, admitted under the care of Mr. Hilton (although this surgeon did not see him), on the evening of March 26th, 1859. He was a man addicted to intemperate habits, and during a fit of intoxication he fell in the street on the curb-stone; it was stated by a bystander that he uttered an exclamation referring to his head before he fell. On admission he was in a perfect state of stupor, and smelling of

liquor; his pupils were unequal, and his arms were slightly rigid; there was also a scalp-wound on the left temple. On the following morning he lay in the same state of insensibility, with stertorous breathing; he did not move in the slightest degree, but no paralysis of any particular part, as his limbs fell dead when raised. His urine was not albuminous. He was a fat man and bloated, which suggested the presence of visceral disease. He remained in the same condition all that day, and died on the following morning, thirty-six hours after the occurrence of the symptoms.

*Post-mortem examination.*—On left side of head was a scalp-wound, but there was no blood beneath it evincing any great contusion. The cranium was quite sound; also the dura mater, externally, was quite natural. On removing this membrane a large quantity of blood was seen covering the left hemisphere of the brain, and proceeding downwards to the base; in all about two ounces of coagulated blood were removed, and more above than below. The brain itself was structurally healthy, and no injury to any part was discoverable, nor any rupture of sinuses, veins, or arteries; the latter were very much diseased. The heart was undergoing fatty degeneration, the liver was very fatty, and the kidneys were the subject of Bright's disease.

CASE VIII.—*Sanguineous effusion. Cause doubtful.*

E. H—, æt. 58, was admitted into Guy's Hospital, on the evening of the 31st of May, 1859, under Mr. Forster's care, with this history: that on the morning of that day, having previously felt giddy, she had fallen down while in her room, and struck her head against the door. She was taken up insensible, but recovered in about ten minutes, when she spoke and was put to bed; in twenty minutes she again became unconscious, and remained in the same state all day, and was then brought to the hospital. She was then in a perfect state of coma, with stertorous breathing, and she occasionally moved her head from side to side; the limbs were rigid, and there were occasional twitchings in them, and she sometimes drew up her legs when touched. The left pupil was for a time larger than the other, but this condition varied; also the face

appeared paralysed, first on one side and then on the other. The urine was albuminous. No bruise could be found on the head, and therefore, with such obscure indications of injury, trephining was not had recourse to. It was the opinion of one observer that the symptoms were altogether due to uræmic intoxication. She died on the following morning.

*Post-mortem examination.*—No bruise was discoverable externally, but on reflecting the scalp a slight ecchymosis was seen over the forehead towards the right side. The cranium was healthy, presenting no sign of injury in any part, and the dura mater appeared also not to have suffered in any way, and no blood was present on the surface. On removing this membrane the whole surface of brain was seen to be covered with blood, in fact, the cavity of the arachnoid was filled with coagula; these extended also as a layer over the sides as well as the base, and there appeared more on the left side. The ventricles of the brain were healthy, and the substance of the brain. A careful search failed to find the source of the hæmorrhage, whether from the larger veins or arteries outside the brain; the latter were very much diseased. There was no ecchymosis of cerebral substance, and no apparent injury to any of the venous sinuses. The kidneys showed commencing degeneration.

These two last cases exemplify the difficulties to which we refer: both patients were taken into the accident wards as having received injuries, and yet the post-mortem examination presented no other appearances than those witnessed in Case 1, where the effusion of blood was altogether spontaneous and pathological.

## CASES OF POISONING ;

THREE BY SULPHURIC ACID, ONE BY SOAP-LEES, ONE BY  
ALCOHOL, AND ONE BY BURNETT'S SOLUTION.

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*Since our last Report the following are the most interesting  
Fatal Cases of Poisoning which have occurred in our Wards.*

### POISONING BY BURNETT'S SOLUTION (CHLORIDE OF ZINC).

*Death at the expiration of fourteen weeks.*

Sarah R—, æt. 40, was admitted under Dr. Wilks's care on December 24th, 1856, and she died January 9th, 1857. She stated that she was a servant, and that twelve weeks before, then being in good health, she went to visit a friend, and that the latter, intending to offer her a glass of gin, gave her instead a glass full of Burnett's disinfecting fluid. She swallowed it down and kept it on her stomach for about ten minutes, when she vomited and brought it up again. She afterwards felt a burning sensation in the throat and chest, but no pain in the stomach. The sensation in the chest left her after two or three days, and since she has had no pain whatever, and never any in the stomach. The sickness, however, continued, and ever since, after taking food, she has vomited, and some returned ; the bowels have been regular, and she has never observed any blood in the vomits or evacuations. In spite of these gastric symptoms she had been able to follow her occupation.

On admission she did not appear very ill, although she was feeble and still suffered from the gastric symptoms. When in bed there was nothing indicative in her countenance of any severe disease ; she was spare, but not wasted ; her skin was cool ; pulse 72 ; and the tongue had merely a slight white fur. There was no tenderness of the epigastrium or any other part

of the abdomen, and the latter had a slight tendency to be flattened or contracted. She seemed to be suffering from simple prostration, due to want of nourishment. She was ordered—

Magnes. Carb., ℥j;  
Acid. Hydrocyan. dil., ℥iij;  
Mist. Camph., sextis horis;

and milk and arrowroot diet.

Under this treatment the vomiting, according to her own account, was less urgent; she fed herself by spoonfuls at a time, and only occasionally returned the milk and medicine. At the end of the first week the gastric symptoms were less severe, but at the same time she had taken very little nourishment, and her general feeble condition had not improved. The vomited matters merely consisted of the food taken mixed with mucus; the motions were solid and healthy.

On December 30th she complained of a pain in the left hypochondriac region. A mustard poultice was applied, and on the following day a blister. The medicine was changed for Julep. Bismuthi Sedativum, and a little wine was ordered.

On January 2d she appeared very ill, being much lower, and there was considerable febrile action present; the skin was hot, tongue furred, and the gums were red and covered with a white sordes (resembling the effects of mercurialism); the abdomen was flat as usual, and not tender, but an uneasy feeling still existed in the left side. The patient's mind was clear, but she was considerably depressed, and showed much anxiety of countenance. She took but little nourishment, and this was for the most part retained. It appeared now certain that she was suffering from a severe organic gastric disease, and that from the pain, &c., the external coats of the stomach had become involved. From this time she gradually sank.

On January 5th she presented much the appearance of a patient with cholera; the skin was dusky; she lay prostrate in bed; her arms outside the clothes, and these were livid and cold; the eyes sunken; pulse scarcely perceptible; she was sensible, but spoke in a whisper from excessive debility; her body was warm; tongue, mouth, and gums, covered with a brown sordes.

During the three following days she lay in the same dying condition, and it was quite remarkable that she lived so long.



She was delirious in the night, but in the day she was sensible, though could scarcely articulate. It was observed that she had a slight catch in the breathing, which appeared to originate in the left side, and suggested some disease in that part. She occasionally threw her arms about, which still remained livid and cold. She died at last on the morning of the 9th January.

*Post-mortem examination.*—Body spare, but not much wasted; abdomen rather contracted.

The *mouth, pharynx, tongue*, and upper part of the *œsophagus*, presented no remarkable appearance, but the mucous membrane was rather pale. The lower four inches, however, of the tube presented slight ulceration of the surface; these ulcers were quite superficial, and consisted merely of a slight roughened condition, affecting the longitudinal rugæ.

The *larynx, trachea*, and *bronchi*, healthy.

The *left lung* universally adherent to chest and diaphragm by old cellular tissue; the lower lobe in a state of recent hepatization. The diaphragm on thoracic side healthy, but on the opposite abdominal side, next the stomach and spleen, it formed the walls of a small abscess.

*Heart* contained the usual firm fibrinous clot on the right side, and the muscular tissue was healthy.

*Abdomen.* Flat. There was no decided *peritonitis*, but the whole of the serous membrane had a slight greasy feel when touched, as if there were some exudation on the surface. The *intestines* were all very much contracted, and solid feculent scybala could be felt within the colon. All that could be seen of the *stomach* was its contracted pyloric extremity, the fundus lying deeply hid in the hypochondriac region. The omentum was puckered up, and attached the surface of the transverse colon to the pyloric end of the stomach; when these were separated, a small hole passing into the stomach was exposed.

When the stomach was removed, together with the spleen and part of diaphragm to which it was adherent, it was seen to be remarkably contracted, and able to contain only about a quarter of a pint of fluid. It measured five inches in length, and nearly half of it, towards the pylorus, was not larger than the small intestine, and this was the only part of the organ visible when the abdomen was opened. The stomach contained

within it about two ounces of a slate-coloured, thick fluid, mixed with mucus, but no blood. The mucous membrane was variously coloured, of a white and slate hue, but there was no redness or injection, of surface. It was corrugated or puckered throughout, but there was no breach of surface except in two places, and these were situated near the pyloric and cardiac orifices. The former was the one before mentioned, and seen when the colon was removed from the stomach, and had been the cause of the adhesion. Looking from within the organ a ragged ulcerated surface was seen just above the pylorus; it was about the size of a shilling-piece, and in its midst was a small hole, which had penetrated the entire coats. At the left extremity of the stomach, immediately beneath the oesophageal orifice, there was another round perforating ulcer; through this the finger could be passed, and made to enter a circumscribed space or abscess, situated between the diaphragm and spleen. Adhesions had already formed to limit the cavity, so that it was only about an inch in diameter, and could not have held more than two drachms of pus.

*Liver* healthy. *Intestines* contracted; contained solid feculent matter. Other organs healthy.

#### POISONING BY BRANDY.

CASE.—Timothy B—, æt. 27, under Mr. Cock. The man was a vagrant, and while passing along the road on the afternoon of January 28th, 1857, about four o'clock, he saw a bottle, containing about a gallon of brandy, fall from another man's shoulder, and the contents run into the gutter. Unable to resist the temptation, he stooped down and drank his fill, when on again attempting to rise he staggered, was unable to walk, and, in fact, was already in a state of intoxication. He was taken to the station-house, and it was understood that the stomach-pump was there applied, and emetics administered. Continuing insensible, he was brought to the hospital at two o'clock on the morning of the following day, the 29th. The stomach-pump was again applied, but nothing was removed. He was collapsed, cold, and unable to swallow. He lived twelve hours after admission, and twenty-two after the

debauch. His condition did not vary much, except that about an hour before his death he was roused to a state of consciousness, and asked for something to drink. The pupils were much dilated, and the respiration very slow.

*Post-mortem examination, twenty-four hours after death.*—

Body that of a strong muscular man, who had died suddenly, in previous good health. Skin congested. Pupils equal, slightly more dilated than usual.

*Brain*, healthy structurally. Like all the organs it was much congested, and exuded a large quantity of blood when excised; the cineritious matter was of a very dark colour; there appeared to be a slight increase of subarachnoid fluid, for the pia mater could be very readily stripped off the brain, leaving the surface moist and watery. The brain-structure was firm, but at the same time moist. The ventricles contained about the usual quantity of ordinary serum. There was no odour about the brain, and no spirit could be obtained by distillation.

Mucous membrane of *air-passages* of a dark colour from congestion, and covered with small amount of secretion. *Lungs* filled the chest, bulky and heavy; when cut, they were seen to be exceedingly congested, and in parts almost apoplectic, and transuded a large quantity of serum.

*Heart*. The right side rather more distended with blood than usual; both auricle and ventricle filled with a dark, soft clot. No separation of fibrin had taken place, and no precipitation of red globules to produce decolorization. The left auricle contained a small quantity of dark fluid blood, and the ventricle also a little of the same character. Muscular structure healthy.

*Stomach*. Distended with air; contained three or four ounces of a black, pultaceous substance, containing hard white pieces of a vegetable substance, which appeared to be apple. The mucous membrane was rather pale, except at the pyloric end, where considerable injection of the capillary vessels existed, not producing, however, a uniform redness, but pale, rose-pink spots; this appearance was only noticed upon close observation, and, in all probability, presented no decided evidence of irritation or inflammation, as it is a condition so often seen. There was no odour of brandy, but only the usual

sour smell of the gastric contents ; a small quantity of spirit, however, was obtained from it.

*Intestines.* Duodenum was healthy ; it and the jejunum were filled with a dark-coloured, soft matter, like that in the stomach. The ileum contained ordinary faecal matter, as also did the large intestine.

*Liver, spleen, kidneys, &c.,* very much congested, but otherwise healthy. Urine in bladder natural.

#### POISONING BY SOAP-LEES.

CASE.—Charles T. C—, æt. 1½ year, was admitted under Mr. Hilton, on September 4th, 1857, at six o'clock in the evening. About an hour before, the child had drunk from a cup about a mouthful of soap-lees ; some oil and mucilaginous fluids were administered, and he was then brought to the hospital. The child was then very ill, and in the course of an hour or two some difficulty of breathing came on, but this did not appear sufficiently extreme to warrant tracheotomy ; the most marked symptom after this was an intense heat of skin. The child died at five o'clock on the following morning, twelve hours after swallowing the fluid.

*Post-mortem appearances.*—The *mouth* and *tongue* were slightly excoriated and of a light-brown colour. The *fauces*, *tonsils*, and mucous membrane of *pharynx* had a slightly swollen appearance, and presented a similar yellowish-brown hue. The whole of the *œsophagus* presented a similar condition, the mucous membrane having a brownish colour, particularly the longitudinal rugæ. The membrane was changed in character by the alkali, but was nowhere destroyed. The greatest pernicious effect had been produced at the very extremity of the *œsophagus*, where the interior was of a dark-brown colour ; this terminated at a definite line, the mucous membrane of the stomach immediately below being quite unaffected. The *stomach* was contracted ; it was found, on opening it, quite empty, the rugæ were well marked, and the whole mucous membrane had a slightly pink hue, being more than usually injected. These appearances were, however, so slight, that, unless especially looked for, they would probably have been disregarded. As before stated, the termination of the *œso-*

phagus was of a dark-brown colour, but this terminated abruptly at its margin. Near the pyloric end of the stomach, near its greater curvature, there were a few rugæ of a very dark-brown colour, produced, no doubt, by the action of the alkali. The mucous membrane thus altered was not at all soft, nor could it be stripped off, but on the contrary was hard and had a horny feel. The *duodenum* was healthy. The *larynx*, at its top, was almost closed by the greatly swollen epiglottis, the enlargement being due to an effusion of serum within it; the glottis itself was only slightly swollen, and upon raising the epiglottis and looking into the larynx the passage was seen to be quite free; the vocal cords nor any other part having been touched. The *lungs* showed some lobules in the first stage of inflammation. The *heart* was healthy, and firmly contracted.

#### POISONING BY SULPHURIC ACID.

CASE.—William V—, æt. 56. This man's mind was not perfectly sound, and, therefore, the account he gave of himself was received with some doubt. When he was admitted, on the evening of October 28th, 1856, he walked up stairs to his bed, and did not appear very ill, although dejected, and did not speak much. He stated that he had been to a friend's house, and there, by mistake, drank about a dessert-spoonful of oil of vitriol. His mouth was of a brown colour, but not excoriated. Magnesia and milk were given him. On the following day, and also on the third, he appeared depressed, but he was not otherwise ill, and it was thought, from the mildness of the symptoms, that he would recover. On the fourth day, however, he died rather suddenly, or, at least, unexpectedly.

*Post-mortem examination.*—Body that of a strong, muscular-looking man. A yellow fluid running from the mouth, which was acid. The brain was not quite healthy. The mucous membrane of the *mouth* was of a yellow colour; but when this yellow epithelial layer was removed, the mucous membrane left was healthy. The front part of the *tongue* was also discoloured, but not the back. The *œsophagus* throughout was of a yellow colour; the mucous membrane was only affected in the most prominent ridges, but the walls of the organ were

swollen to three times their natural thickness. This was due to a sero-albuminous exudation into the submucous tissue. The top of the *larynx* was also slightly swollen in the same manner. The *stomach* appeared natural externally, and of usual size. Upon opening it, it was found to contain about a pint of a bright-yellow fluid. The mucous membrane was only affected to any extent at the pyloric half of the stomach. The fundus in which the fluid was found lying as usual, had only a yellow tint like the *oesophagus*, and the mucous membrane softened ; but towards the middle of the stomach and the whole of the pyloric half the interior was of a black colour, and raised up in large projecting masses or ridges, which were in a sloughing condition, and would soon have been cast off. This black matter consisted of carbonized and decomposed mucous membrane with blood within it. The whole coats of the stomach were soft, and readily tore. The charring of the stomach ended at the pylorus, but about two inches of the duodenum were of a purplish colour, and the rugæ were blackened ; below this the intestines were unaffected, both small and large. The small contained a similar yellow matter to that in the stomach. The contents of the stomach were not acid, nor was any of the poison discoverable. The *heart* was healthy, and contained a firm, decolorized fibrinous clot on the right side, not acid.

POISONING BY DILUTE SULPHURIC ACID.—*Death in eleven days.*

CASE.—Charlotte D—, æt. 55, admitted under Mr. Cock, on October 5th, 1855, and died October 16th. She was a woman of weak intellect, and she stated that about seven o'clock in the morning she drank a wine-glassful of vitriol on an empty stomach. On subsequent inquiry, it appeared that she had drunk the greater part of the contents of a three-ounce bottle, containing sulphuric acid of the strength of one acid to four of water. She was admitted at nine o'clock, collapsed, almost pulseless, and extremities cold ; there was no stain on the mouth, and she was unable to swallow the magnesia which was prescribed. She was constitutionally an old and feeble woman. In the course of two hours reaction had occurred ; she became warm, and began to vomit some blood and pass

blood by stool. That vomited was found to contain sulphuric acid. In the evening she was able to swallow a little milk and warm water, and was decidedly better. During the following three days she was very low, but there were no urgent symptoms, though she continued to pass blood, and, occasionally, to pass grumous matter by stool. On October 9th she was able to swallow without difficulty. She had no vomiting, but a kind of dysenteric diarrhœa. Thus she continued during the next few days; very low, but taking small quantities of food. On the 16th she had been able to get out of bed, but in the evening she was found, unexpectedly, dead in her bed. She never complained of any pain.

*Post-mortem examination.*—Body that of an old, impoverished-looking woman. Brain wasted. The mucous membrane of the *mouth* was rather white. The *fauces* and *pharynx* were affected like other parts of the alimentary canal, but to a less degree; that is, all the prominent folds of the mucous membrane were inflamed, the surface roughened and covered with a granular deposit of lymph, to which adhered some curd of milk. *Œsophagus* presented, at its lower end, some prominent rugæ, also having the mucous membrane in like manner affected with some brown granular lymph which was closely adherent. *Stomach* rather contracted, and smaller than usual; when opened, it was found to contain about two ounces of yellow fluid; this was without odour, and very much resembled the uncoagulated yolk of an egg. Covering a greater part of the stomach was a thin membrane of a yellow colour, which was quite detached, except at one spot; this was the mucous membrane, which had thus almost entirely sloughed off, and looked much like the omentum when destitute of fat. The surface beneath was of a brown or purplish colour, hard, and raised in nodules. It was the lesser curvature which was thus most severely affected, the fundus having escaped.—*Duodenum*. Upper part of a dark colour, the surface of some rugæ slightly ulcerated. *Jejunum* and upper part of *ileum* healthy, and containing a yellow fluid. The lower part of *ileum* was covered with a fibrinous exudation in patches, as the colon, but not to so great an extent.—*Large intestine*. The whole mucous membrane presented very much that appearance seen in what is sometimes

called diphtheritic inflammation. It was of a brownish gray colour, the surface rough, from the exudation of a granular lymph over it. This was very adherent, and not easily removable, as it was closely incorporated with the mucous membrane. The lower part of the rectum was not much affected.—*Heart*. Immediately beneath the left aortic valve there was a small ecchymosis or effusion of blood; it was situated in the muscular wall, beneath the endocardium. Other organs healthy.

#### POISONING BY SULPHURIC ACID.

CASE.—Eliza B—, æt. 17 months, was admitted under Mr. Forster, July 28th, 1857, at ten o'clock in the evening. The child was in delicate health, and was suffering from symptoms of chronic hydrocephalus; the mother, intending to give it some syrup of buckthorn, administered instead a teaspoonful of oil of vitriol. The child was soon afterwards brought to the hospital, when, on account of the apparent suffocation, tracheotomy was performed. Relief was obtained, and it was thought possible that recovery might take place, but the child died at five o'clock on the following morning.

*Post-mortem examination*.—The *brain* presented appearances due to disease, as increased fluid in the ventricles, &c. The lips were excoriated and of a brown colour, and the same appearance was presented by the *tongue, pharynx, and whole of œsophagus*. The mucous membrane was destroyed in some parts, and in others some adventitious matter could be scraped off, which appeared to be partly an inflammatory exudation. The top of the *larynx* was almost closed by the swelling of the mucous membrane, or rather by an acute inflammatory œdema of the submucous tissue. Below this the trachea was healthy, but presented the opening made by the operation. The *heart* had the right side moderately distended with fluid blood; the left ventricle was firmly contracted, and contained only a small, soft coagulum. The *stomach* appeared natural externally. Upon opening it it was seen to have suffered extremely from the acid, its inner surface being charred and of a black colour. This was principally the case at the middle part, and towards the lower end, the blackening becoming less at the pylorus;



the fundus had escaped, the walls here being merely thinned by ordinary gastric solution. On the pyloric half of the stomach the mucous membrane was raised into a thick, hardened, black, massive layer. The stomach contained a few drachms of a brown fluid, which contained no acid. No poison had passed beyond the pylorus. Other organs healthy.

Amongst the cases of recovery from small doses of poison, there have been several illustrating the local effects of strong mineral acids on the mouth and throat, and of which we give the two following examples. The ulterior effect, by causing constriction of the œsophagus, is seen in the case of gastrotomy described at another page.

*Effects of Sulphuric Acid on the Mouth.*

CASE.—William R—, æt. 56, a lighterman, admitted under Dr. Wilks, May 18th, 1857. About four hours previous to admission he went into a cellar, and taking up a bottle which he thought contained beer, put it to his lips; about a table-spoonful passed into his mouth, and then, finding it intensely acid, he spat it out, and did not swallow any. Discovering that the bottle contained oil of vitriol, he immediately took some milk and chalk and water, and then went to a medical man, who gave him an emetic, which caused him to vomit freely. Soon afterwards his bowels were moved twice.

On admission he was seen to be a healthy man, but his expression heavy and distressed. He complained of a violent burning pain in the mouth and throat; he spoke with difficulty, and with pain. The mucous membrane of the mouth and fauces was covered with a whitish fur, which was already peeling off in parts, leaving a raw, reddish-brown surface; this was especially the case on the dorsum of the tongue and the end of the uvula. The teeth presented a yellow and black fur, like the sordes of fever. The mouth was filled with a frothy, viscid, tenacious fluid, which he rejected in considerable quantities with almost constant and distressing retching, caused by the fluid irritating the fauces. The fluid rejected was of a reddish-brown colour, containing shreds of mucous membrane, and seemed to be a mixture of mucous and saliva; its reaction

on test-paper neutral. He could swallow fluid in small quantities, but with great difficulty, causing great pain and a convulsive cough; and sometimes the fluid returned through the mouth and nares. He had slight pain in the stomach, but this did not come on until after taking the emetic, and a feeling of sickness remained. His breathing was rather hurried and difficult, but his great distress prohibited a physical examination of the chest being made. Pulse 72, and hard. He was ordered milk and arrowroot and a mixture of Magnes. Carb. Tr. Opii and Mucilage, and glycerine to apply to the mouth.

On the following day, May 19th, he had passed a very restless night, the difficulty of swallowing was greater, and the pain in the mouth more. The mucous membrane was separating in large flakes, but he did not eject so much fluid, and this not so dark nor tenacious. Skin warm; pulse 76. Bowels not been moved.

May 20th.—Had had a comfortable night and was better; the mouth not so painful, the destroyed mucous membrane had almost peeled off, and he could swallow with less difficulty. He had had considerable pain in the bowels, which were freely opened, evacuations being liquid, offensive, and dark-coloured. Had slight cough.

21st.—Progressing favorably. Ordered beef tea and arrowroot and porter.

22d.—He could now articulate distinctly and speak with but little pain. The mouth and throat continued sore, and smarted when he took food. The lips were stamped with the shape of the teeth.

24th.—Was progressing favorably, but had increased cough and sore throat.

Potassæ Chlorat., gr. x.;  
Tr. Cinch. co., ʒj;  
Decoc. Cinch., ʒi, ter die.

26th.—Has improved rapidly the last two days. The mucous membrane of mouth and fauces appeared quite restored, and assuming natural appearance; he was able also to masticate a little.

June 2d.—Mouth and fauces quite restored, and he left hospital.

*Effects of Nitric Acid on the Mouth.*

CASE.—Richard G—, æt. 26, a greengrocer, admitted, under the care of Dr. Hughes, March 14th, 1857. He stated that on the previous day he drank about a teaspoonful of nitric acid, mistaking it for vinegar. Immediately his lips, tongue, and throat began to burn, and, running to a medical man, took an emetic; subsequently he took some white mixture at intervals.

On admission his countenance was anxious and his pulse quick. His lips and tongue had upon them a dark brown scab, his mouth was very tender, and he had a constant burning sensation in it. Glycerine was applied, and magnesia mixture with opium taken internally. Eggs and milk.

On the 15th he had had a very bad night; pain in the stomach, scabs on lips were beginning to come off, and the whole mouth and tongue has a bright yellow colour.

17th.—Better, though still some febrile symptoms; tongue cleaning.

21st.—He left convalescent.

DESCRIPTION  
OF  
SOME NEW WAX MODELS,  
ILLUSTRATING  
SEVERAL CASES OF ELEPHANTIASIS, DISEASES OF THE NAILS,  
&c. &c.

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ELEPHANTIASIS, OR LEPRO TUBERCULOSA.

AMONG all forms of cutaneous diseases this has excited the greatest share of attention, both because of its hideous and incurable nature, as well as from its supposed connexion with the leprosy of the Jews. It has very generally been styled *Elephantiasis Græcorum*, in distinction to *Elephantiasis Arabum*, or that remarkable affection, occurring mostly in tropical climates, where one limb often reaches an enormous size. To avoid confusion in the terms, the French have for a long time applied the term leprosy, or *lepra tuberculosa*, to the former of these diseases, according to the original signification, while the epithelial affection, or *lepra vulgaris*, they transfer to psoriasis. There is a modern and growing belief that this form of elephantiasis observed in Egypt, the West Indies, north of Europe, &c., is a modification of the leprosy of the Jews, but varying according to circumstances of race and climate, and that no country or people are altogether free, not even our own. The subject has received fresh light from the investigations of Danielssen and Boeck, who have studied the disease as it exists in Norway and Denmark, and who have clearly separated it into two varieties, which, although occasionally running together and closely allied, yet assume such well-marked different cha-

acters that they are generally clearly distinguishable. This division has already been recognised as truthful by surgeons practising in the West Indies, and agrees more or less with the division already made by Robinson. The Norwegians speak of two affections common in their country—*spedalsked* and *radezyge*; it is the former which we understand by elephantiasis, the latter probably being peculiar to Scandinavian countries, and appears, according to description, more like lupus. The *spedalsked* it is which the above-named authors have closely studied and divided into two forms, which they style *lepra tuberculosa* and *anæsthetica*, a division also well known in the West Indies.

The disease is said to be due to an albuminous exudation into certain parts of the body, in the one case producing hypertrophy of the skin and subcutaneous cellular tissue, causing large protuberances on the face and indurations of the surface of the body, while in the other this albuminous matter is thrown out in the course of the nerves, causing at first anæsthesia and subsequently wasting of the parts. This is not a mere theoretical pathology, for the hypertrophy of the skin is clear in the one case, and in the other, as we ourselves have heard from the lips of a Norwegian physician, the albuminous or adventitious matter is found surrounding the nerves when they are dissected. Still, as before said, the two conditions may be combined, as seen in the cases related below; where, in the tuberoso examples, some loss of feeling existed, and in the anæsthetic some induration of the skin. The disease appears to be generally ushered in by what are called rheumatic pains and, in the tuberculous form, by brown patches appearing on the surface of the body, which afterwards become indurated and protrude; there may be also some loss of sensation in the parts. As the disease advances, and the enlargement of the features increases, the patient presents a hideous appearance, and the hands and feet become enlarged and indurated; the skin may then ulcerate, and subsequently the mucous membrane of mouth and larynx become affected, producing hoarseness, &c., and death results at last from the laryngeal affection. In the anæsthetic form, owing to the albuminous exudation in the course of the nerves, there is first of all pain in the limbs, subsequently loss of feeling, and afterwards an atrophy of the

parts, and not uncommonly vesicles or bullæ on the surface; these results are seen in the models of the hands below described (Case III). The fingers and toes sometimes die away or decay, constituting the affection known as joint-evil in the West Indies (Case II). The anæsthetic form of elephantiasis is well seen in the case of a patient lately under the writer's care, and described as Case I.

It has already been stated that a question has always existed how far elephantiasis corresponds to the leprosy of the Jews, and how far the affection is peculiar to one country. It seems probable, according to the observation of the before-mentioned writers, that although it prevails as a common disease only under certain favouring circumstances, yet that no country is absolutely free from it, and in corroboration of this statement we may refer to the example of the Irishman, who had never been out of the neighbourhood of London, and whose case is described under Case v. The symptoms and appearances presented by this man exactly resembled those of the genuine examples of the disease, as met with in other countries; and although, from the general belief that the affection cannot exist in England, Dr. Addison was fain to style it *elephantiasis spuria*, yet, on perusal of the case, the reader will fail to find any characters which can distinguish it from the true form as seen elsewhere.

Apart also from the genuine affection, it has been thought that lesser degrees or modifications of the disease may exist under the various names *alphia*, *melas*, *leuce*, *vitiligo*, *morphæa*, &c., expressions used by Hippocrates, and still applicable to many remarkable affections met with in our own country. Thus, instead of the whole body being affected, a certain part only may be touched, and the disease is then manifested by a raised or tuberoso patch on the skin, or by a spot becoming anæsthetic, and subsequently atrophic. Of this kind we have the two very remarkable forms, related as Cases ix and x. These conditions of skin thus approach in character the disease known as *keloid*, an affection, however, which would require a separate notice.

*Lepra Anæsthetica.*

CASE I.—Edward G—, æt. 24, admitted under Dr. Wilks's care, February 9th, 1859. He was a Government clerk at Trinidad, and had not long arrived in England. When first seen, whilst dressed, he presented no very remarkable appearance, excepting a swollen state of the nose and an extreme feebleness, indicated by his slow movements and his manner of speech. When placed in bed, however, it was found that about half the surface of the body was affected by the disease. Beginning at the head, the nose, as before said, was swollen, and of a bluish colour, owing to an hypertrophy of the skin, but this was not sufficient to produce that loathsome appearance seen in the following cases; there was also some ulceration of the mucous membrane within. This condition of nose caused some obstruction to the passage, and gave a nasal twang to his speech; the swelling and taste were impaired, and there was partial loss of sensation of the external integument. The ears were much in the same condition; they were enlarged, and indurated from hypertrophy of the tissues, of a slate colour, and devoid of feeling; he was also partially deaf on both sides. The skin of the face elsewhere was naturally rather dark, but there was no evidence of any morbid discoloration. As regards the extremities, the hands were both affected, being swollen and of a bluish colour, giving just the appearance as if they had been exposed to cold and frost-bitten. This hypertrophy of skin, however, was only on the posterior part of fingers and hand, and these were quite devoid of sensation when touched. In consequence of this anæsthesia he had burned one of his fingers from placing it too near the fire, and an ulcer remained. This condition of hands extended up the forearms, but more in the form of discoloured patches than swellings, or at least only the slightest induration could be perceived when the finger was passed over the part, and all these discoloured parts were devoid of sensation. The feet were more severely affected than the hands, and approached very much in character the condition seen in the other variety of lepra, as described under Case IV;

they were both much swollen, of a purplish colour, and the cuticle was exfoliating, producing a scurvy or powdery appearance of the surface; perfect anæsthesia existed in both. Nearly the whole surface of the lower extremities was discoloured, and consequently anæsthetic, with the exception of a few healthy patches of skin here and there, which preserved their natural colour and sensation; the left leg was worse than the right. The gluteal region was of a universal brown colour; the skin indurated, but not raised, and quite devoid of feeling when touched. The back was scarcely affected, or the abdomen, but the front of the chest was covered with a large brown patch, as if painted with tincture of iodine; over the whole of this space, as well as on some smaller spots, sensation was altogether lost. The surface of the body, wherever affected, was of a brownish hue; but the extremities, as hands, feet, nose, and ears, were of a bluish tint, and showed some induration, or swelling, as well as mere discoloration.

The young man gave the following history.—He was always delicate, and when a child had fever and ague, followed by abscesses in various parts of the body. About the year 1848 he began to experience uneasy sensations, like pins and needles, in his limbs, and at the same time some degree of numbness. The affection was called rheumatism, and in the course of some months the pains were relieved, but he never recovered his former health. In 1850 it was evident what the nature of his malady was, for his left arm became slightly swollen, also his right foot, and at the same time sensation began to be impaired. He observed also that they changed colour, and they ceased to perspire like other parts of the body. The complaint then gradually advanced, affecting other parts, until about eighteen months before admission, when all the symptoms became much worse, and his feet, hands, nose, and ears, became swollen, and at times inflamed; sometimes even an excoriation would occur, and a slight discharge take place; he then began to lose his smell and taste. His slight deafness had existed, more or less, from the very onset of the complaint.

He brought with him a French pamphlet, in which was recommended a drug, named *hydrocotyle*, said to have been used with success in Paris, as well as in India, for elephantiasis



and similar complaints ; but the patient left the hospital before inquiries could be made concerning it, having had an offer of return to the West Indies.

*Atrophy of the Hand from Lepra anæsthetica, represented in Model No. 233.*

CASE II.—The fingers of the hand are seen to be almost shrivelled away, and the skin covered with white scales. The disease had been styled in the West Indies coco bey, or mal de San Lazaro. The patient was Francis R—, æt. 36, who died in the Kingston Hospital, Jamaica. He was born at St. Martin's, of Creole parents. He went to sea at the age of 13, and became a planter at 16, and penkeeper at 19. When 26 years old he began to have numbness of the left hand and of the feet, and soon afterwards contraction of the left fingers. At 31 he used mercurial inunction, and at 33 he had superficial ulceration of the fingers, and three years later a scaliness. He continued at Kingston Hospital from his twenty-ninth year, being unable to do anything. Sensibility was almost lost, which led to various little injuries. The right hand was much less affected, but the body generally was more or less implicated. Moved about with some difficulty. He seemed much older than 36.

*Models of Hands, No. 236<sup>5</sup> and <sup>6</sup>, covered with vesicles resulting from Elephantiasis Græca anaïsthetos, or Lepra anæsthetica.*

CASE III.—George P—, æt. 37, came under Dr. Gull's care in June, 1856. Several years ago (? ten) was resident in Trinidad. For the last four years a loss of feeling had been coming on slowly in the hands, until at last it reached as high as the elbows ; in the same manner the lower extremities had become affected, the loss of sensation reaching as high as the middle of the thighs. During the last year the fingers have become contracted, and bullæ have formed over the affected parts. These generally rise rapidly, and either burst or are ruptured by violence, and leave an inactive superficially-ulcerated surface, as at the present time. There is now a limited ulceration on the inner side of the forearm, also about the nails of the fingers, so

that two have been destroyed by it. Both legs cedematous; above the ankles the swollen parts pit on pressure, but on the dorsum of the foot the tissue is indurated. His gait was much impeded by the want of sensation in the feet and weakness of ankles. The use of hands almost lost, so that he can produce with them only some vague, fumbling movements. Frequent cramps in the legs. The trunk, face, and mucous membrane of mouth, quite unaffected. No thickness of the lobes of the ear, but slight numbness of them.

*Lepra tuberculosa.*

(Under the care of Dr. GULL; reported by Mr. R. INNES NISBETT.)

CASE IV.—John H—, æt. 42, a native of Kingston, Jamaica, of European parents, was admitted into Job ward on May 3d, 1858. He has been engaged during the last twenty-six years as a blacksmith in the navy, living on board ship, and principally on tropical stations. During the whole time he enjoyed robust health, and has had no disease except syphilis (which he contracted several years ago in the West Indies, but from which he states he soon recovered under medical treatment) until the commencement of his present malady. He says that he has never been a drunkard, but has always been much addicted to venery. His present symptoms commenced about sixteen months previous to his admission into this hospital; first by cedema of the lower extremities, followed by an eruption of small red tubercles or lumps, which very soon began to ulcerate in various places. He continued in this state for several months, the ulcers healing in some places, and breaking out afresh in others; this was succeeded by a severe attack of erysipelas of the head and face, following a scalp-wound; from this he recovered in about three weeks, after which the tubercular eruption broke out afresh, and in a much more aggravated form, affecting the whole body, with the exception of the scalp. The tubercles he describes as hard lumps under the skin, varying in size from the bulk of a small pea to that of half a walnut, the larger being on the trunk, the smaller on the face and extremities; they were of the same red colour as at first, but this time they were attended with such excessive itching and uneasiness that he was com-

pelled to give up work on board ship. (He was then on the Mediterranean station.) He was sent to England, and was admitted into the Dreadnought Hospital, where he had another attack of erysipelas, on the subsidence of which the whole of the tubercles disappeared, leaving the skin in some places of a dark-reddish, and in others of a tawny-brown colour. He continued free from the tubercular eruption for two months, at the end of which he had erysipelas a third time; his legs again became affected as at the first—viz., with an eruption of tubercles quickly proceeding to ulceration. Hitherto his general health during the intervals of these attacks had been comparatively good; but now his appetite became disordered, sometimes failing, at other times quite voracious. His nose and lips began to swell, and feel excessively itchy and painful; this was quickly succeeded by giddiness and confusion of ideas, which so increased that on the Saturday previous to his admission into this hospital he became quite outrageous, and continued in a state of wild delirium for two days, during which he had to be tied down to his bed. The paroxysm gradually subsided; but he still remained giddy and confused, and haunted by ocular spectra, especially during the night.

*Condition on admission.*—He has a singularly bloated, harsh, and uncouth visage, quite satyr-like, occasioned by the swollen and hypertrophied condition of the skin of the face, which is furrowed with deep wrinkles, its venules also looking congested, and much more numerous than natural. The eyes look watery and somewhat prominent, the sclerotic muddy, and the conjunctivæ injected. There is, however, no pain, and the sight is unimpaired. The eyelids are swollen; the hair from the eyebrows and the eyelashes is beginning to fall off. The alæ of the nose widely dilated, distorted, and covered with small whitish scales and dark marks as of thin blood-crusts. The lips are very much hypertrophied, and similarly affected. The skin of the trunk and upper and lower extremities is studded with small dark-red spots, appearing as if blood had oozed from a number of minute punctures, and then hardened over them. There are also numerous tawny-coloured spots, of a large size, marking the sites where the red tubercles had previously existed. The skin of the hands and wrists has a livid and glossy appearance, and on scratching it it looks white and powdery.

The feet and legs are cedematous, and the ankles are covered with thin, dirty, whitish squamæ, which are easily removed, covering the stockings with a scaly powder. The toe-nails are very imperfect, and look cracked and dry, and so brittle that they are easily broken off. There is perfect anæsthesia of the skin over the head and face; also over the wrists, hands, legs, ankles, and feet; but sensation is perfect over the whole trunk, arms, and thighs, also on the neck and ears. The mucous membrane of the hard palate is covered with a grayish slimy-looking incrustation, which remains after repeated washing and scraping; the fauces are similarly affected, and deeply and irregularly furrowed, as if ulcerated; the tongue very much roughened and furrowed, and covered with a whitish incrustation, not removable by scraping. Taste as yet very little impaired. The breath is very fetid; there is no discharge from the nostrils; the body is not at all emaciated, and the muscles are well developed. The breasts look very much hypertrophied around the nipples, the left one especially so, feeling as if a small tumour, about two inches in diameter, existed between the skin and the muscle. He complains of a constant shooting pain in both breasts, which is increased by pressure. His head feels giddy and confused, and he continues to be haunted with horrid phantoms. The chest is well formed and resonant; sounds of the heart normal; impulse feeble. Pulse 80, small and weak. Appetite capricious; thirst considerable; bowels regular. The urine 1020 specific gravity, acid reaction, and deposits a small quantity of mucus on standing. Sexual desire, which at the commencement was excessive, is now entirely lost; the testes, however, do not appear wasted. There is no trace of elephantiasis in his family history.

During the ten months he has continued an inmate of Guy's Hospital he has been treated with various remedies, but none seem to have had much effect in staying the progress of the disease, which has gone on slowly (as its nature is), changing very little in its general symptoms.

The following are some of the changes which have been observed during his stay in the hospital, until May, 1859: The giddiness and spectral illusions ceased shortly after his admission, and he has only occasionally complained of them since; delirium has not recurred. He complains of increasing low-

ness of spirits, attended with great languor and faintness after slight exertion. He has had several attacks of nausea and vomiting, with occasional febrile symptoms; frequent and excessive night-sweats; a feeling (as he expresses it) of "dead coldness" in both breasts; pricking and shooting pains in his limbs, especially at night. The appearance of the skin has very little altered, with the exception that several crops of tubercles, of considerable size, have appeared on his legs and arms, and have then gradually been absorbed, leaving reddish and tawny spots, and, in some places, whitish, shining, and hardened cicatrices. Very few of the larger tubercles have ulcerated; but the small ones on the nose and lips have done so frequently, discharging a glutinous-looking fluid, which hardens and scabs over the parts. The beard has ceased to grow, and he has shaved only once since his admission; the eyelashes are few; he has had an eruption of tubercles under the hairy scalp of the occiput, which has caused partial baldness over the part. The inflammation, while it lasted, was greatly relieved by cold applications. The eyes have become more prominent; the vascularity of the conjunctivæ, and the muddiness of the sclerotic, have both increased. The yellow spot (described by Danielssen) can even now be seen slightly elevated, and spreading like a ring around the margin of the cornea, which is irregular in its outline, especially at the upper border. He began to complain of deep-seated pain in the eyes in the first week of March, since which it has increased considerably; vision as yet is unimpaired. The anæsthesia is not constant, but the reverse; it is also very variable—*e. g.*, a portion of skin may be now anæsthetic, and in a few days regain sensation; and another part, which to-day has perfect sensation, may, in a few days, become anæsthetic in its turn. Within the last few weeks a small tumour has been observed in the upper and front part of both thighs, a little below Poupart's ligament, of an oval, elongated form, and easily movable under the skin; there is, however, no pain on manipulation.

The patient alleges that he has had a discharge of dark-coloured blood (amounting to about three or four ounces at a time), on several occasions during the last five months, from the urethra; also that at the same periods a white, milky-looking fluid exuded from both breasts. The latter part of this state-

ment neither Mr. Nisbett nor others who have constantly watched him have yet been able to verify. What he states concerning the urethral discharge has been found to be correct. His testes are now considerably wasted.

*Lepra tuberculosa occurring in London.* (Models 237—240.)

(For this report we are indebted to Dr. GULL.)

CASE v.—Dennis M—, æt. 28, was admitted under Dr. Addison, presenting a very frightful and loathsome appearance from distortion and swelling of all the features, large folds of thickened skin overhanging the eyes, and similar masses nearly meeting them from the cheeks. He gave the following history: that he was a native of Cork, and that he left his country twelve years before, and that he had since been employed as a tailor at London and Croydon—five years at the latter place, and seven in town. He was always in good health until eight years ago, when he had syphilis mildly; he had no other symptoms than those of a chancre, and for this he was treated by Mr. Gay and Mr. Stanley; he was cured by the latter gentleman with pills, but his mouth was not made sore; he did not have any rheumatic pains or any other symptoms following the disease. About a year after this he stated that he contracted another primary sore, and of this he was again soon cured at St. Bartholomew's, as an out-patient. Five years ago he went to work at Croydon, at an establishment where there were ten or twelve other men employed; he was now subject to a close air and a hot atmosphere, and then the symptoms of his present disorder began. He stated that the heat and the gas of the room affected him very much, and he had not been well since. The temperature was so excessive that he had known men faint on the board, and often the perspiration has been so profuse that he has taken off his shirt to wring it.

The first symptoms of his present disorder were a pricking in the arms and face, much the kind of sensation which is experienced when a limb falls to sleep and is recovering itself. At this time the skin was quite clear. This pricking continued for two years; he sought advice for it, but it could not be accounted for. As, however, he stated that he had had syphilis,

his medical attendant ordered him mercurials, which soon profusely salivated him, and also he took iodine and iodide of potassium; this seemed to make him very weak. At the expiration of about another year he observed an eruption appearing on the face, and in some parts as lumps and blotches. The hands subsequently became gradually swollen and indurated, and afterwards the feet. These slowly became worse, but during the last year he had continued at work until he was at last unable to hold the needle, partly from the numbness and thickening of the skin, and partly from general weakness. He had also been hoarse, with a cough, attended with expectoration, but the throat was not sore.

*Present appearance, or as he was on admission.*—Features rounded and swollen, giving the expression of boldness to the face; the thickening of the skin affects the alæ of the nose, the lips, cheeks and ears in particular; it also spreads over the forehead to the edge of the hairy scalp, but does not invade it, the skin between the hair being white and perfectly healthy, and the hair also. There is also almost complete exemption from the disease in the course of the whiskers. The beard and the eyebrows have been invaded, so that the former is entirely, and the latter to a great extent, gone, the few hairs remaining being sparse and thin, except towards the inner side, where they are less thin. At the inner canthus of either eye there is a patch of healthy skin. The affected surface is smooth, and, in part, finely tubercular. The skin of the trunk is not affected with thickening, and is healthy, with the exception of a slight-diffused brownish discoloration here and there over the sternum and the scapulæ. The skin of the abdomen is quite free from disease. The upper and lower extremities were similarly affected; the upper part and front of the arms and the thighs but triflingly discoloured with a slight blotching or faintly-mottled appearance; the thickening of the skin on the thighs begins from the upper third, affects the knee and the legs, but the skin of the part is generally thickened, brawny, and tense. In the arms the disease begins from the lower third of the forearms; on the wrists and the hands, especially on the dorsum, the skin is, as on the feet, thickened and brawny, and mottled by blotchy venous congestion. On passing the hands over the part nodulated indurations

are felt where the skin is more deeply congested, as at the beginning of boils in the skin. On the backs of the hands the skin is so thick and hard that he does not feel any object lightly passed over them, but on the face and the other parts, although there is a clumsy, uncomfortable sensation, there is not anæsthesia (the skin of the face feels clumsy, but not numb). He can perceive a fly when it settles upon his face. The sensation on the palms of the hands and soles of the feet is pretty good. On the feet and toes the skin is whitish, from the formation of a slight scaliness. The tingling complained of before the skin became affected is now altogether gone. His sexual appetite is not greatly altered, and although specifically questioned, it does not seem either weakened or augmented. When informed that in his complaint the sex-appetite was often increased, he states that it is not so in his case, and that he has not experienced any change in his feelings. His muscular strength is feeble, and he has generally emaciated. His appetite is good, and has been so throughout. There are no nodes on bones, nor any periosteal pains anywhere. Urine normal. Bowels regular. No sore about anus. Chest healthy. His voice is hoarse, but he has no cough. The top and middle of the tongue is thickened and nodulated like the skin, and the circumvallate papillæ at the back much enlarged. The sense of taste is not impaired, but there is a tenderness about the tongue. The mucous membrane of the cheeks not affected. The soft palate and the uvula have a white, granular, and cicatrized appearance, but no trace of ulceration; the result seems to have arisen from a slow degeneration of the tissue. The sclerotic has a slight cinnamon zone around the cornea, the irides are bright, the transparent cornea of the left eye rather hazy, the result of ophthalmia which he had had previously, but no proof of iritis. For the last three or four years he has been subject to profuse sweatings, and when he was in the hospital I have often seen his shirt as wet as if he had been overboard. The toenails are much split, and the finger-nails are not similarly affected. The skin is nowhere ulcerated, except on the left ala of the nose, which has been sore for a few days from picking it; no spontaneous ulceration. This report was taken in the summer of 1852. He was treated with different remedies, as *Liq. Potass.*, *Arsenit.*, without relief; subsequently with cod-liver oil,



without any marked benefit. At another time his health appeared to improve under the use of Mist. Ferri co. and generous living. The disease, however, continued slowly to progress, and in November, 1852, the report states that the backs of the hands had begun to ulcerate, and the joints of the fingers swollen and rigid; the indurated parts of lips and tongue also ulcerated. The voice also nearly gone, and the fauces injected, and occasionally bleeding. The back of tongue is roughened by large, warty papillæ, which are disposed to ulcerate. His laryngeal symptoms still remained, producing hoarseness and sometimes loss of voice. On the 24th May, 1853, he walked out of doors as usual, when great difficulty of breathing came on, and symptoms of laryngeal obstruction, and he died on the evening of same day.

*Post-mortem examination.*—The body was not able to be examined until four days after death, when already decomposition had considerably advanced. The heart, lungs, liver, spleen, kidneys, intestines, and in fact all the organs, were healthy, with the exception of the skin and the larynx. The former presented the hypertrophy as seen before death, and this condition proceeded by the mouth into the throat and larynx. This organ and the trachea showed the whole of its mucous membrane, as far as the bifurcation, in one state of ulceration; this condition was very old, for some ulcers had healed, and the mucous membrane which remained, as well as the submucous tissue, was much thickened; the whole surface had thus a rugose appearance. The epiglottis had numerous cicatrices upon it, due either to ulceration or some chronic change in the membrane; the cordæ vocales were also ulcerated.

*Lepra tuberculosa.* (Model 232.)

CASE VI.—This affords a very good example of the face affected with this disease. The skin is thickened and tuberculated, and of a dull brown colour. The patient was a young man æt. 20, who had been in the West Indies. The leg and toes were also affected; he appeared to die from the exhaustion consequent on diarrhœa. On inspection, no visceral disease was discoverable. The hair had fallen from the scalp and the body generally.

*Lepra tuberculosa.* (Models 234, 235, 235<sup>5</sup>, 235<sup>10</sup>.)

CASE VII.—These represent the face, arm, buttock, and leg of a man affected with this disease. He was about fifty years of age, and had resided eighteen years in Jamaica. The disease commenced in the face; there was no loss of sensibility in the affected parts; the voice became slightly hoarse while under observation. The face presents on forehead and cheeks a number of raised dull-red tubercles, with lighter-coloured, irregular, and depressed centre; small commencing tubercles are seen on the eyebrow; on the temple are several more, which appear to be extending or passing into one another so as to isolate a portion of healthy skin. The arm shows patches of a dull-red colour, and hard, with minute deep-coloured papular elevations; the centre of the patches paler. The buttock is in the same condition, and the leg also presents large tubercles and patches; the heel presents an elevated, hard, isolated tubercle.

*Elephantiasis, or Coco bey.* (Models 233<sup>5</sup> and 10.)

CASE VIII.—These represent the nates and foot of a boy who was affected with this disease. He was a white Jew boy, of creole parents, living in Jamaica, and fourteen years of age. The disease was attributed to his drinking cold water. The skin was indurated in various parts, and of a slight bluish colour. The nates especially, as here shown, were discoloured, skin hardened, and covered with numerous pits about the size of a sixpence, of a squareish form and of white colour, and looking somewhat like cicatrices. The foot is seen covered with tubercles of a pinkish-brown colour, or of a lighter hue. There was no ulceration, at this time, of any part; one of the ear-lobes was becoming thickened.

*Morphæa alba atrophica.* (Model 228<sup>15</sup>.)

CASE IX.—Case of Elizabeth P—, æt. 8, admitted under Dr. Addison, in December, 1855, having been sent to him as a

case of keloid, and to which disease it bore, indeed, a close resemblance. A long report exists of her previous history, of her having had various infantile disorders and eruption on the body, which is described as impetiginous. She was a delicate child, and resided at Mile End. It was stated, with respect to the present affection, that, three years before, a small brown spot appeared on the forehead; this changed to a white or silvery hue, and then began to extend both upwards and downwards, reaching to the hair above and to the tip of the nose below, and depressed beneath the surface. This was the appearance on admission, and presented in the model a white depressed mark, running down the forehead from the root of the hair along the bridge of the nose to its extremity, its width averaging about half an inch. It appeared as though the skin had completely atrophied from the effects of a wound. It was tight over the bone, and when the child frowned was not wrinkled like other parts; there was no loss of sensation in the part. After four months' various treatment the child left the hospital, and with no alteration in the appearance of the disease.

*Morphœa alba lardacea, or Leuce.* (Models 300 and 300<sup>b</sup>.)

CASE X.—This model represents the head and face of a woman, presenting a white, raised, glazy patch, about an inch in breadth, passing from the top of the head to the bridge of the nose; the edge is slightly inflamed; to the left is a smaller patch, with a transverse band, and on the temple and nose a similar spot.

The patient was about fifty years of age, and had been married for some years, but had had no children. The disease appeared about twelve months before the model was taken, and was first observed by the hair over the part affected becoming snowy white, and subsequently falling off. It commenced at the root of the hair, at the parting, as a spot similar to that on the side of the nose; this spot extended upwards and downwards, and six months after the first appearance a second spot appeared over the left eyebrow; both had gone on increasing, as if they would coalesce. There was deficient sensation in the affected spot. She was in easy circum-

stances, and enjoyed better health than when she was a younger woman. We are indebted to Mr. Toulmin for the case.

The second model of the same case shows that the disease did not advance as was supposed, but commenced a retrograde process. This was taken in 1857, about three years after the first; the white mark had shrunk to a level with the surrounding skin, and was of a pink colour; the other spots also were less visible.

If the atrophy should continue, a depressed mark will be produced, as in the preceding case; and this, combined with the whiteness of the hair, would then exactly correspond with the leprosy of the Jews, as described in Leviticus: "And if the hair of the plague is turned white, and the plague in sight be deeper than the skin of his flesh, it is a plague of leprosy," &c.; and Celsus: "*λευκη habet quiddam simile alphi: sed magis albida est, et altius descendit; in eaque albi pili sunt et lanugini similes.*"

#### MODEL OF ARM REPRESENTING SYPHILITIC KELOID.

*(From a Case under the care of MR. BIRKETT.)*

The attention of the profession has been lately directed to the subject of keloid, by Dr. Addison, in a recent volume of the 'Medico-Chirurgical Transactions.' The disease is allied to the elephantiasis of which we have been speaking, in so far as it consists of the deposition of an albuminous product into the skin and subcutaneous tissue, producing an induration of the integument, and, by a subsequent contraction or atrophy, a cicatrilform appearance. Thus in some cases a defined circumscribed tumour is formed, in another a tumour with a claw-like process, and in another a mere cicatrilform patch. From the resemblance which these cutaneous affections bear to the results of injury or disease, it is not remarkable that they should sometimes be seen to arise from the latter, or be implanted on them; and thus a keloid may not only spring up spontaneously, but take its origin in an ordinary scar.

The model under consideration is interesting as representing

this form of disease, having its seat in the ecthymatous pustules of syphilis, and also as showing another form of cutaneous affection following syphilis which we believe has not hitherto been described.

W. C—, æt. 22, a brass-founder, was admitted, under Mr. Birkett, into the syphilitic ward, December 15th, 1858. He had had sores on the glans penis, and was now suffering from the secondary effects; his body was covered with pustular scars and small red keloid tumours. These were raised, hard, red and shiny, and sent out claws or processes into the surrounding skin. The man stated that after the pustule had dried up, instead of a cicatrix forming, a hard tumour appeared, which grew until it assumed the appearance seen in the model.

#### MODELS ILLUSTRATING DISEASES OF THE NAILS.

##### *Cases of Inflammation of the Roots of the Nails, followed by their decay.*

(By SAMUEL WILKS, M.D.)

Whether this affection be an old and recognised one, but from being more prevalent of late, attention only now particularly directed to it, or whether it be an altogether new disease, we cannot say; but during the last year several instances of it have come before our notice amongst the out-patients. All the examples have been in women, and mostly in those of middle age. The disease has first shown itself by an inflammation at the root of the nail, indicated by redness of the skin, pain and swelling, and in one case followed by a slight serous exudation; after this the nail at the root has become of a black colour, portions have come off, and the disease has continued downwards until the whole nail has exfoliated.

CASE I.—Model of hand, 244<sup>10</sup>.—Mary D—, æt. 56, came as an out-patient, under Dr. Wilks, for a decay of the nails both of hands and feet. She stated that, three months before, she observed the nail of the left hand, of the ring-finger, beginning

to dry and crack, and coming off; soon afterwards she observed the same with the other nails, afterwards the thumb of the right hand, and then the same with the toes of both feet. On pointing out to her the inflamed condition of the skin at the root of the nail, she stated that this had preceded the decay in every finger. She was a healthy-looking person, and could assign no cause for the disease.

The hand exhibits on three fingers and a thumb about half a nail, decayed and black, and at the roots quite destroyed. The anterior half which remains is dry, brown, and cracked, with its posterior edge black and dead, so that a slight effort would have removed the whole nail. It appears, by looking at the hand, as if some cause of decay had commenced at the root of the nail and then proceeded onwards to the tip. All the nails of left hand affected and thumb of right, also some toes of both feet. The skin everywhere healthy.

Model 244<sup>11</sup> exhibits one finger in the early stage of the disease, and before the nail is affected; the skin at the root is red and swollen, indicating an inflammatory process.

Model 244<sup>13</sup> exhibits the foot of the same patient, with the inflammation surrounding the roots of the nails.

CASE II.—Model 244<sup>15</sup>, exhibiting the hand of a woman of rather younger age, also attending amongst Dr. Wilks's out-patients. The disease in this case was not so violent, but the same kind of inflammation existed at the roots of the nails. The latter were decaying, but not dead; they were thin and soft, so that they could be easily bent or turned up at their edges. No disease of the skin elsewhere, and the patient was in good health. There was no local cause assignable, both women being merely engaged in ordinary domestic avocations. Both left, after having taken Fowler's solution for about a month, the disease at that time having made no advance.

Another case was that of Elizabeth H—, æt. 36, a cook, living at Wimbledon. In her case all the nails of the fingers were decaying, and the roots were inflamed, from which she stated there was sometimes a slight discharge. None of the nails had yet fallen off, and the toes were unaffected; she also had sometimes great pain in the ends of the fingers. The disease

had been slowly progressing for six months. The patient was very anæmic and in very bad health, and after a second visit ceased to come.

About the same time a younger woman came for advice for a similar affection. She was engaged at a paper-mill, but it could not be learned that anything injurious or likely to cause the disease was used in the manufacture.

*Disease of the Finger-nails, arising from Arsenic.*

(Model .)

(By J. COOPER FORSTER.)

During the last two winter sessions it has been customary, with a view of preserving the "subjects" for the purposes of dissection at this School, to have them injected with a saturated solution of common white arsenic. The quantity of fluid thrown into each body has been about one quart, consequently a very small proportion of arsenic, owing to its insolubility, could have been contained in that amount of water. Notwithstanding that the quantity of poison must have been small, compared to that which is frequently used in many trades, an effect has been produced upon the finger- and thumb-nails of many of the students, and slightly of the demonstrators, Messrs. Maunder and Durham, which we have not before seen noticed. This effect having been particularly remarkable in the case of our dissector for lecture, Mr. F. M. Cann, we will give his own account of his case and sufferings.

"In the early part of January, whilst dissecting for Mr. Cooper Forster, I noticed an inflammatory action going on beneath my nails, and at the same time those parts and the tips of the fingers became exceedingly painful, more particularly so on rising in the morning. The "subject" was, as usual, injected with arsenic, and at the same time very moist. Continuing my dissections, after the lapse of a few days pus formed beneath all my nails except the thumbs, which wholly escaped. My sufferings now were very severe, and daily grew more and more so, until I adopted the expedient of an india-

rubber shield for each finger, which protected them from further irritation. I may mention that I was now in the morning quite unable to button my shirt, yet felt comparatively little annoyance during the day when wearing the shield. The nails now presented a remarkable appearance, having a central yellowish white deposit, extending towards the proximal end of the nail, with an irregular line of a bright pink colour, extending from side to side, bounding the pus nearest the root of the nail. A model has been made by Mr. Towne, at Mr. Forster's wish, and is to be seen in the museum, representing the nails when they had been attacked about a week. In a few days the pus apparently decomposed, and the nails presented a peculiar dirty-looking appearance; all pain ceased, and the fluid disappeared, leaving the nails almost entirely separated from the subjacent parts. Mr. Woodman, my fellow-dissector, who was equally exposed to the irritation of the arsenic in this "subject," suffered but slightly, and only in one or two fingers. On subsequently dissecting the abdomen of another "subject," likewise injected with arsenic, without shields, the nails and fingers again became tender, and a red line of inflammation again presented itself, pointing out exactly the extent to which the previous mischief had extended and the commencement of fresh disease; but this time the thumb-nails became affected, and went through the various stages that the fingers had previously undergone. The fingers were but slightly attacked."

A great many of the students have been similarly affected, though in a more trifling manner than our dissector, Mr. Cann. In the case of the demonstrator, Mr. Maunder, the pus seems to have left few traces of its ravages. The nails of Mr. Cann, for several weeks after the injury, presented a disagreeable appearance, arching over the ends of the fingers, without adhering to them; moreover, they allowed an accumulation of dirt which it was almost impossible to remove by the greatest attention to cleanliness, and which gave rise to constant uneasiness, though not amounting absolutely to pain, and which even now, five months after the commencement of the disease, is not got rid of. Portions of the nails were submitted to analysis by Dr. Taylor, and very distinct traces of arsenic found; they seemed completely to have become



imbued with the poison, not having been examined until quite three months after the first attack. We are not aware of any disease being described exactly analogous to the case we have related, though in many trades arsenic is used rather largely, and cases of ordinary poisoning are not unfrequent from its use. Death fortunately rarely happens from the result of this application of the irritant, although severe gastric symptoms not unfrequently arise; in almost all the cases, however, where arsenic is used in the arts, it is in combination with potash or soda, which, though it causes a much larger quantity of the poison to be dissolved, may possibly have some effect, by this chemical combination, in preventing the injurious local results produced by the powder simply dissolved in water. On the other hand, doubtless, in making a simple solution a quantity of the acid remains suspended in the water, and then, when thrown into the tissues, in the process of injecting the "subject," may act as arsenic usually does when locally applied. Arguing, therefore, from the known effect of arsenic as an agent for destroying the tissues, it is, we think, fair to presume that, in the case of the students, a quantity of the powder may have become insinuated under the nail, and so produced its escharotic effect upon the least organized portion of the fingers. We have no other explanation for the apparent anomaly of its use in large quantities when combined with an alkali in the process of sheep-washing, for instance, unattended by any injurious effects, and yet in the case of the small quantity here used the most painful local disease being produced. In no one instance of any of the students can there be said decidedly to have been produced any of the usual effects by poisoning by arsenic, and thus it seemed entirely to confine its ravages to the above-mentioned local form of disease.

*Eczema impetiginodes of Fingers.*

(By W. W. GULL, M.D.)

CASE.—Mrs. B—, æt. 53, under the care of Dr. Adam Martin, of Rochester. The disease began in the nail of the left thumb, and in the course of a week or two all the nails of

the fingers and toes were similarly affected, until, as seen in the model, they were all covered with the crusts of the eruption. The burning pain attending the inflammation of the roots of the nails was very distressing. The rash was not quite confined to the fingers and toes, for there were one or two spots on the hands and about the loins. The treatment consisted in nutritious diet and the use of the *Liquor Arsenici Chloridi*,  $\text{m}\text{x}$ , bis die. The fingers were washed with a weak solution of borax, and afterwards brushed over with the *Lotio Hydrargyri Nigra* and glycerine, and the recovery was rapid.

**MALPOSITION**  
**OF THE**  
**ABDOMINAL VISCERA**  
**IN RELATION TO**  
**THE CAUSES AND DIAGNOSIS OF DISEASE.**

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BY S. O. HABERSHON, M.D.

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ALTHOUGH there is generally great constancy in the position of the abdominal viscera, there are some modifications of their respective positions which are to be borne in mind in the diagnosis of disease. Instances of complete transposition of the viscera are recorded; but are of such rare occurrence that the following instance, which occurred a short time ago at Guy's, is worthy of being detailed.

**LATERAL TRANSPOSITION OF THE WHOLE VISCERA.**  
(See Plate.)

CASE.—Elizabeth S—, æt. 48, was admitted into Guy's on March 22d, 1859, in a dying state, suffering from urgent dyspnoea; the countenance was livid and the pulse almost imperceptible. She had been subject to winter cough for several years; and for a few days there had been sudden aggravation of her symptoms. Complete examination could not be made, as she was lying on the right side; and was unable to be moved; the heart was, however, inaudible in its normal situation; this might have been attributed to the emphysema and bronchitis, which were the cause of death; and it was not known till the post-mortem inspection that the viscera were transposed. On opening the

abdomen, the stomach and spleen were found on the right side, the cæcum and ascending colon and the liver on the left; the descending colon and the sigmoid flexure were on the right side. The thoracic viscera and the vessels of the neck were transposed; the left lung had three lobes; the apex of the heart pointed to the right; its cavities and valves were normal; the arteria innominata passed to the left, and the right subclavian arose from the aorta. The thoracic duct also was placed on the right side in the neck.

The relative position of one viscus with another may be very much changed—first, by distension; secondly, by rotation of one upon another, or on their own axes; thirdly, as the effect of old adhesions; and, fourthly, by congenital arrangement. We will follow them in their natural order, considering the *stomach* first. Obstruction at the pylorus often causes great distension of the stomach. It is no uncommon thing to find the viscus filling nearly the whole abdomen, and the pylorus situated even in the hypogastric region. Any obstruction of the pyloric orifice may produce this effect; but it is more frequent with simple fibroid disease of the pylorus. In cancerous disease the presence of infiltrated glands adhering to the stomach, and retaining it in its normal position, renders this change less common. Without any obstruction, however, the stomach sometimes becomes enormously distended with flatus; but in these cases the pylorus is less depressed, and continues near to the liver and gall-bladder. A somewhat similar semi-vertical position of the stomach is in many cases the effect of wearing stays during early periods of growth; the lower ribs being prevented from expanding, the horizontal position of the stomach is exchanged for a vertical one; and although at later periods of life there may be no such abnormal pressure, the relaxed peritoneal supports do not recover, and much permanent discomfort is the result. It is not unfrequent to find the pyloric curvature of the stomach preternaturally increased, so as to give to the viscus a slight hour-glass appearance; but this central contraction is greatly exaggerated where a cicatrix exists, or chronic ulceration prevents more uniform expansion. Moderate distension manifests itself in the form of the abdomen by rounded, tympanitic elevation of the left hypochondriac and epigastric regions. But enormous distension of the stomach is sometimes accom-

panied with severe pain, and may readily be mistaken for peritonitis, or even for internal strangulation of intestine. Where it is associated with tumour, the altered position of the pylorus is apt to confuse our diagnosis, by leading to the idea of disease in other parts, as in the omentum, &c.; but the earlier symptoms of gastric disease have generally rendered the case clear. Fatal cases of simple gastric flatulence have occurred, but they are generally relieved by opiates, ammonia, ether, or other volatile stimulants, by enemata, and by friction. Where associated with organic disease, the use of fluid diet, or the administration of nutrient enemata, affords some mitigation of the symptoms.

The fixed position of the *duodenum* renders any change very unusual. We have once observed a double twist in a case of obstruction of the intestine. The opposite character, as to mobility of the jejunum and ileum, the freedom of the mesentery allows them to assume varied parts of the abdomen without any disturbance of the ordinary function. Sometimes nearly the whole of their coils are in the pelvis, or they are tied together by old adhesions. One very unusual position in which we found them was behind the stomach, in the sac of the lesser omentum, having passed through the foramen of Winslow. Many feet were thus situated without any known symptom; but the appearance of small intestine above, behind, and below the stomach, was a very peculiar one.

The physiological and pathological conditions of the *cæcum* suggest many points as yet very imperfectly investigated. This part of the alimentary canal is generally fixed in the iliac fossa, is covered on its anterior surface by the peritoneum, having the ileum entering on the left side, the ascending colon passing from its upper part, and the appendix connected at its lower part; but this arrangement is very frequently departed from, and, in some instances, interferes with normal action, and predisposes, if not actually induces, fatal obstruction. It is well to remember that the three bands of muscular fibre unite in the lower part of the *cæcum* at the appendix, and that the contraction of those fibres has an influence on the direction of the intestine as well as of the valve; and, further, that when the appendix is fixed the movements consequent on that contraction must be different. In very many cases the *cæcum* is surrounded on its

posterior aspect by peritoneum, and is attached to a free mesentery, so that the extent of its movements is very much increased, and it may readily pass into the pelvis or to the left side; but if the appendix be fixed, by a short mesentery or by bands of adhesions, whilst the intestine is distended with flatus or fæces, rotatory movements readily take place. Since only a part of the cæcum is covered by the longitudinal bands, we frequently find that in atrophic states of the intestine the right side bulges out in a globular and almost hernial form. This condition is more common in advanced life, or in struma and phthisis. We have observed the contraction of a cicatrix to shut off this globulated portion of the cæcum, so as to render the passage from the ileum to the ascending colon about the size of the ileum itself. (See Fig. 1.)

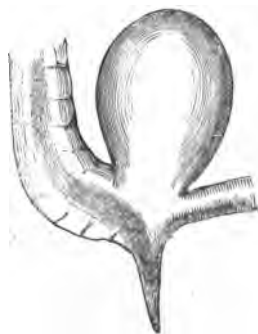
FIG. 1.



Case of Sydney H—, aged 42, who died from phthisis, November, 1858. There were large vomicæ at both apices, and tubercles deposited throughout both lungs. Numerous ulcers were found in the ileum, and coils of the small intestine were placed in front of the cæcum. In the cæcum itself there was a chronic ulcer, with thickened margin, which had produced contraction, almost occluding the head of the cæcum; a narrowed channel extended from the ileum to the ascending colon.

Rokitansky describes three varieties of rotatory movement of the intestine; first, upon its own axis; secondly, upon the mesentery, as an axis; and, thirdly, upon another coil of intestine. The cæcum must be regarded as moving either upon its long or short axis. In the former the direction of the colon will assume a direction more or less to the right, or even in a horizontal direction to the right side, as seen at Fig. 2. This condition we have observed without any apparent impediment to the passage; but where there is habitual constipation, it fa-

FIG. 2.



vours distension of the cæcum and disease of the appendix. By means of rotation on its short axis the appendix is placed towards the anterior abdominal parietes, or, on the contrary, is situated quite at the posterior aspect. (Figs. 3 and 4.) Or the cæcum is observed to be so twisted that the

FIG. 3.

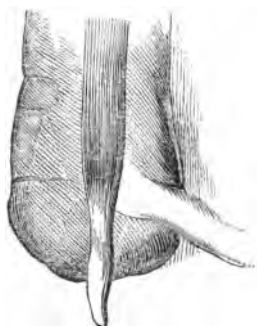


FIG. 4.



ileum opens on the right side. This condition was found in a case where the appendix was directed towards the liver, and the transverse colon adherent to the cæcum, forming a sigmoid curve in the abdomen. (Fig. 5.) There was

FIG. 5.



no marked obstruction, but very readily might the opening of the ileum have become occluded, and the diagnosis of disease be rendered obscure.

Where these movements are combined, not only is the ileum found opening on the right or posterior aspect, but the head of the cæcum is completely inverted, so as to be directed towards the diaphragm. This was the case in an instance of fatal obstruction, which we have recorded in some 'Observations on

Diseases of the Alimentary Canal' (page 212).

In the second form of rotation, *upon the mesentery as axis*, there is greater probability of obstruction. It can only take place when the cæcum is very free, which may then easily

pass into the pelvis, or be completely rotated on its axis. In the last number of the Guy's reports a remarkable case of this kind is recorded by my friend and colleague, Dr. Gull. The diagnosis was exceedingly obscure; paraplegic symptoms were associated with violent and almost constant vomiting; the bowels, although very constipated, were acted upon; and the day before death intense pain came on, and evident symptoms of general peritonitis. He was twenty-eight years of age, a delicate, strumous subject, and his illness commenced six months prior to his death, with violent and persistent vomiting; weakness of his legs then came on, and gradually increased. There was no abnormal curvature of the spine, but some tenderness in the lower dorsal and in the lumbar region, and he remembered eight years before having fallen flat upon his back from a height of three feet. There was no evidence of any disease in the lungs, heart, or brain. The spinal membranes and cord were in appearance healthy, but Dr. Gull detected inflammatory deposit in the cord. In the abdomen there were general peritoneal inflammation and extravasation of fæces. The cæcum was in the pelvis, enormously distended and ruptured, presenting an opening two inches in length; its mucous membrane was intensely injected. The ascending colon passed up to the spleen on the left side, then, after a very sharp angle, descended on the same side to the sigmoid flexure in the left iliac fossa. The ascending and descending colon were adherent to each other, and empty. The cæcum was twisted upon itself, and the passage into the colon obstructed. These twisted positions of the cæcum and its free mesenteric attachment are generally found in *strumous* subjects; they predispose to disease of this part of the intestine and to lodgments and ulceration of the appendix. We have not, however, observed that they have any connexion with the length of the intestine as a whole.

*Attachment of the Appendix.*—The mesentery of the appendix is generally short, and attached at the inferior aspect of the cæcum; sometimes fixed to the brim of the pelvis, and the appendix is then pendant in the pelvis itself; not unfrequently the mesentery of the appendix is attached to the lower part of the true mesentery, or iliac mesentery; in such case the appendix runs parallel with the ileum for an inch,



or an inch and a half, and is then beyond its mesentery free. The direction thus assumed is that of the brim of the pelvis towards the left, and the appendix nearly reaches the attachment of the sigmoid flexure. When this condition is found, we frequently have a more or less dependent pouch formed between the appendix and the ileum, consisting of the folds of peritoneum. This pouch is worthy of notice, because, from irregular pressure, it becomes atrophied, then probably perforated, so as to allow other coils of small intestine to pass through it. The opening thus formed oftentimes becomes the cause of internal hernia; the traction on the borders of this opening being especially manifested in the direction of the attachment of the mesentery of the appendix, that is, along the brim of the pelvis, towards the sigmoid flexure, leads to fibroid thickening in that position; and as it becomes more and more drawn forward, it assumes the appearance of a band of inflammatory adhesion. The same traction may be the predisposing cause of ulceration of the appendix; and we have seen with this perforation and internal strangulation also associated ulceration and perforation of the appendix.

Immediately above the ileum, at its angle of union with the cæcum, we not unfrequently have a pouch, which in atrophic changes of the peritoneum becomes thinned, and perhaps perforated; the opening thus formed is sometimes the cause of internal hernia.

The *ascending colon* generally passes from the cæcum in the right iliac fossa to the lower margin of the liver. It is sometimes placed on the left side, or the transverse colon appears to commence almost at the cæcum itself; the former arises from malposition of the cæcum to which we have already referred, the latter from extreme distension of the colon itself. In enlargement of the liver the edge of that viscus passes in front of the colon. We have, however, observed several instances where the liver has passed behind the colon; and the detection of a hardened margin nearer to the umbilicus than the resonant colon tended to confuse diagnosis. Enlarged glands around the kidney, or disease of the kidney itself, generally push the colon before them; but this is not invariable, and the intestine is sometimes turned aside.

The mesenteric attachments and arrangements of the

*transverse* colon are such as to allow of great distension ; sometimes, however, its curve is very much increased, so that in a large sigmoid curve it occupies nearly the whole abdomen ; its circumference is much increased, so that it becomes more than twelve inches. Observers have dwelt upon this great distension of the colon as one of the concomitants or causes of dyspepsia, constipation, and much general *malaise*. It indicates great feebleness of the muscular coats of the intestine, and we must almost regard the fibres as having lost contractile power. The *transverse* colon is occasionally so placed as to be entirely below the umbilicus.

The descending colon is more fixed in its position than the ascending, and is very rarely altered from its normal position ; the *sigmoid* flexure, however, like the *transverse* colon, sometimes assumes enormous proportions, occupying the greater part of the abdomen ; its coils also sometimes rotate on its mesentery as an axis, causing fatal obstruction.<sup>1</sup> Cancerous disease of the termination of the flexure is not unfrequent, and great distension, associated with fixed pain at the brim of the pelvis, and insuperable constipation, are symptoms of its presence ; obstruction of the rectum from retained fæces, tumour, hæmorrhoids, &c., lead to similar distension ; but it is also very common in atrophic conditions to which we have alluded as determining distension of the *transverse* colon. The sigmoid flexure is occasionally increased, and united to the inner part of the mesentery of the cæcum or of the appendix ; the communicating band becomes, in some instances, the cause of fatal strangulation ; or a double curve is presented, and variously enlarged. In one instance, the sigmoid flexure, after making its usual twist before passing into the rectum, made a second turn, and passed upwards, dilating into a large sac immediately beneath the duodenum, before it again passed downwards to enter the pelvis. This occurred in a man aged forty. He had been a servant, and stated that he had enjoyed good health till three weeks before death. He was, however, unable to give a definite account of his symptoms ; there was sallowness of the skin, febrile heat, swelling and pain in the left leg. No visceral disease was detected, but he gradually

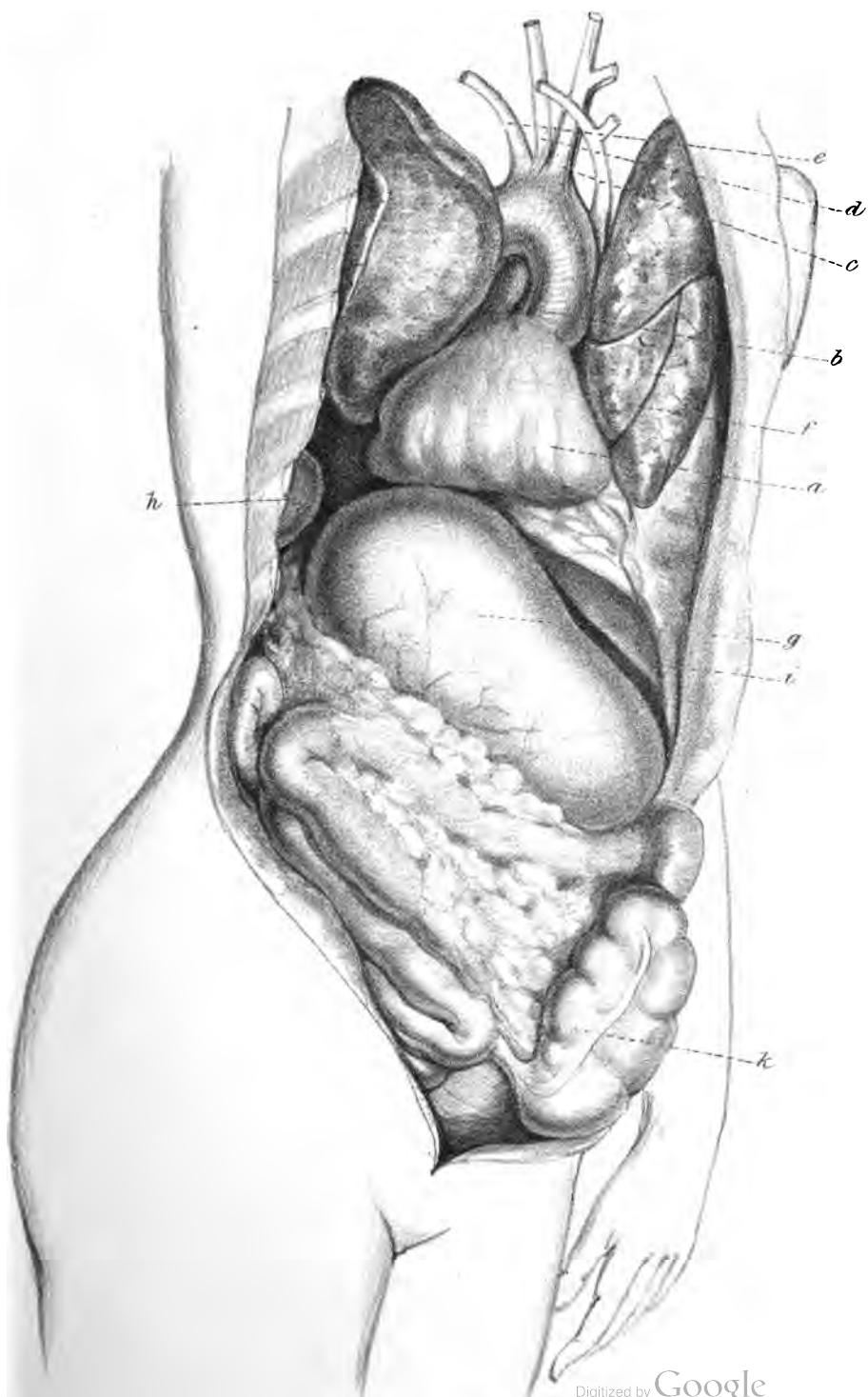
<sup>1</sup> See an interesting communication on this subject by Dr. Barlow, in a former number of the 'Reports.'

became more prostrate. Delirium came on at night, and he gradually sank. No rigors were observed. In the abdomen there had been old peritonitis, by which the coils of the large intestine had become united; the transverse colon formed several secondary convolutions, and beneath the mesentery the enlarged sigmoid flexure was observed. A large abscess was found in the right loin and iliac regions, penetrating to the spine, and extending downwards to the trochanter minor. Clots were found in the iliac veins. There was also recent pleuro-pneumonia. It is probable that this condition arose from unusual curvature of the sigmoid flexure, increased by adhesion and gradual distension.

Occlusion of the rectum and its communication with the bladder or vagina are malformations of fetal life, and do not interfere with the diagnosis of disease in adult life. The instances which arise as sequences of inflammatory or cancerous disease are marked with other characteristic signs, and do not produce the malpositions of the kind referred to in this communication. The varied positions we have indicated as being assumed by the intestine show the uncertainty of resting *solely* on their normal site as our guide in diagnosis.

PLATE REPRESENTING LATERAL TRANSPOSITION OF THE  
VISCERA.

- a.* Heart, apex towards right side.
- b.* Aorta turning towards the right side.
- c.* Arteria innominata dividing into left carotid and subclavian arteries.
- d.* Right carotid arising from aorta.
- e.* Right subclavian arising from aorta.
- f.* Left lung, having three lobes.
- g.* Stomach in right hypochondrium.
- h.* Spleen in ditto.
- i.* Liver and gall-bladder in left hypochondrium.
- k.* Cæcum in left iliac fossa, having the ileum opening on its right side.





## GUN-SHOT WOUND IN THE LUNGS.

FRacture OF THE LAMINA OF THE VERTEBRÆ  
PERFORATION OF THE DESCENDING COLON BY THE BULLET AND  
LARGE WHITE SCISSOR-LIKE WOUND IN THE  
DEATH SEVEN MONTHS AFTER THE BATTLE

By S. J. HARRISON, M.D.

(The first part of this Report is an abstract of the presentation  
in the 'Lancet' for 1881, p. 480, by W. L. HARRISON, Esq.,  
Surgeon to the 1st Regt. Legation.

CASE.—J. B., an Irish private in the 1st Regt. Legation,  
during the siege of Saragossa, was wounded in the chest about  
4 p.m., April 18th, 1808. He was lying down in the  
advanced trench at Francisco's Hill. He had just fallen  
the trench, and whilst returning to his place he received  
a gun-shot wound in the right lung. He had pre-  
viously been severely wounded at the battle of Saragossa,  
had entered below the great breach, and was taken  
from the left lumbar region. After the second battle the  
circular wound was found in the right lumbar region, and  
with the second lumbar vertebra, and was about 10 in. in  
spinous process; on examining the wound he was found  
found to pass upwards and slightly towards the right  
orifice in the lumbar space. The bullet passed about  
about three inches without the wound being very deep, and  
pain on making pressure along the course of the wound.  
complained of constant itching in the chest, and was  
made for the ball, but it could not be found.



## GUN-SHOT WOUND IN THE LOINS.

FRACTURE OF THE LAMINA OF THE VERTEBRA;  
PERFORATION OF THE DESCENDING COLON; FECAL ABSCESS;  
LARGE WHITE KIDNEYS; ALBUMINURIA;  
DEATH NEARLY FOUR YEARS AFTER THE INJURY.

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By S. O. HABERSHON, M.D.

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*(The first part of this Report is an abstract of that published in the 'Lancet' for 1855, p. 606, by T. LONGMORE, Esq., Surgeon to the 19th Regiment.)*

CASE.—J. B—, æt. 18, a private in the 19th Regiment, during the siege of Sebastopol, was brought to camp about 4 p.m., April 16th, 1855, having been wounded in the advanced trench at Frenchman's Hill. He had crept from the trench, and whilst returning on his hands and knees received a gun-shot wound in the right loin. He had previously been severely wounded at Alma by grape-shot, which had entered below the great pectoral muscle, and was excised from the left lumbar region. After the second injury a circular wound was found in the right lumbar region, in a line with the second lumbar vertebra, and two inches from the spinous process; on examining the wound, the finger was found to pass upwards and slightly inwards through a circular orifice in the lumbar fascia; the finger could be introduced about three inches without the ball being felt. There was no pain on making percussion along the spinous processes, but he complained of constant aching in the left shoulder. Search was made for the ball, but it could not be found. There was con-



siderable dyspnœa, and an anxious expression of countenance ; but no cough or expectoration of blood took place, nor was blood present in the urine, or motion passed two hours after admission into hospital. A few hours after the injury severe pain came on, and much febrile disturbance followed.

On the 19th, three days after the wound, the ball passed per anum, with a small piece of paper adhering to it ; no blood was present in the fæces, nor was there any feculent discharge from the wound. The bullet was flattened, and minute spiculæ of bone were imbedded in its apex—the weight, 1 oz. 2 dr. 40 gr.

On the 23d, the discharge from the wound became very offensive, and two pieces of semi-digested onion were discharged from the loin, one piece nearly an inch in length. The slough was partially detached.

On the 25th, a small piece of bone passed from the wound, and there was discharge of fæces both from the wound and from the rectum. He was restless at night, and complained of pain in the abdomen, increased by pressure, and situated opposite the umbilicus. The pain he had previously experienced in the thighs now left him.

On May 5th, he had been delirious at night, and had severe pain in the left side ; great tenderness in the course of the sigmoid flexure of the colon, and sharp pain, on pressing the spine near the wound, came on.

On May 27th, he was daily gaining strength. There was tenderness in the *left* lumbar region, and on pressure there the discharge of pus from the wound in the right loin was increased ; pain extended from the right to the left side, and he described a frequent painful sense of swelling and cramp in the left hypochondriac and lumbar regions, followed by discharge of flatus from the wound. On examining the abdomen by pressure, there was considerable tenderness in the left lumbar and hypochondriac regions. He was able to stand without experiencing any pain ; but when sitting was compelled to support himself with one hand, on account of his inability to bend the spine ; and any sudden attempt to flex the lumbar spine produced pain. When lying down, the muscles on the left side of the abdominal walls were relaxed ; but he seldom remained on the left side. He remained

under Mr. Longmore's care till his return to England; and was then admitted from Chatham into Guy's Hospital, under Mr. Birkett's care, in June, 1856, with a fistula in the right groin, which closed before he left, in September.

He was again admitted, on March 4th, 1857. Mr. Birkett then found an abscess forming in the left lumbar region; this opened, and a fecal fistula was formed in the left lumbar region. The propriety of attempting to facilitate the closing of this sinus by operative means was considered; but was not attempted, and he left the hospital, the fistula remaining open.

On November 11th, 1857, he was readmitted; but in January, 1858, his abdomen becoming ascitic, and his legs anasarcaous, he was transferred to the care of Dr. Wilks. Slight improvement took place, and he again left the hospital.

In December, 1858, he again presented himself at Guy's, and this time under my care. Disease had progressed since the beginning of the year, and it appeared certain that he would not continue many weeks. He was exceedingly anæmiated, and was affected with general anasarca; the urine highly albuminous. The abdomen was supple, it contained some fluid; but was frequently tender and painful on pressure. There was occasional discharge of flatus and of thin watery fæces from the sinus in the left loin; the free evacuation of fæces from the natural passage showed that there was no obstruction. Attacks of diarrhœa, and of great irritability of the stomach came on; the tongue became red and injected; the pulse irritable and frequent; the countenance anxious; mind conscious throughout. Treatment partially relieved the vomiting and diarrhœa; but he continued to sink, and on February 13th, 1859, died.

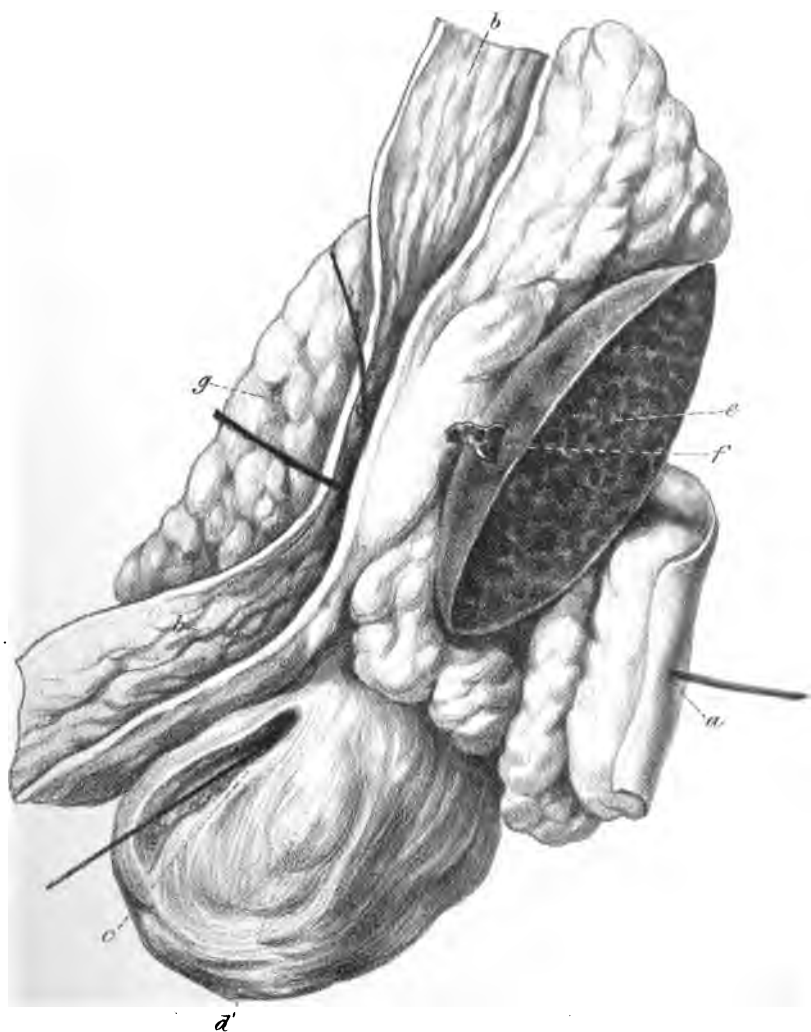
*On inspection*, excepting universal pleuritic adhesion on the left side, the thoracic viscera were healthy. The peritoneum was normal; but, the descending colon was found to be firmly adherent to the left kidney and to the spleen. On opening the descending colon a large funnel-shaped opening was found, bounded by smooth, healthy, everted mucous membrane; this opening in the colon communicated directly with the fistula in the left loin; and also with a sinus, which had passed behind the peritoneum downwards to the left iliac fossa; the latter sinus was bounded by dense fibrous tissue; a second sinus

last few months the treatment was entirely of a palliative character; and although it afforded temporary relief, the patient gradually became more and more prostrate, and died three years and ten months after the injury.

## PLATE

*Exhibiting Gun-shot wound in the loins extending into the colon.*

- a.* External opening of sinus in the loins.
- b.* Descending colon.
- c.* Sinus extending downwards towards iliac fossa, and communicating with the colon.
- d.* Dense fibrous tissue surrounding the kidney and its vessels.
- e.* Spleen.
- f.* Fragment of bullet.
- g.* Omentum.





# CASES OF PYÆMIA.

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BY S. O. HABERSHON, M.D.

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THE two following cases of pyæmia are recorded as peculiar forms of the disease—the one instance, with symptoms of pemphigus, the other arising from gonorrhœa and phlebitis. Since the observations of John Hunter on this subject, modern science has added many facts of pathological importance; and these cases are confirmatory in some degree of the views thus educed.

**CASE I.—*Pyæmia; Blebs on the Skin; Pemphigus (?) ; Typhoid Symptoms; Death.***

Caroline R—, æt. 34, was admitted under my care into Guy's, March 30th, 1859. She was a married woman; but in consequence of her husband being out of work had been reduced to extreme poverty. Her symptoms had commenced a fortnight previously with rigors and pain in the back. These rigors had been repeated every day, and were followed by heat and sweating. There was loss of appetite; and there had been constipation for nine days.

On admission she was in a very prostrate condition; the countenance anxious; she was sensible, and answered questions rationally, but it was with considerable effort; the tongue was dry and becoming brown; the pulse very compressible and frequent; the skin pungently hot; the respiration hurried, but she had no cough; there was coarse respiration at the bases of the lungs, but no dulness or crepitation. The heart

was irritable; but no abnormal bruit was present. There was no evidence of disease in any of the abdominal viscera; nor were any maculæ present. A simple injection was administered; beef-tea and wine given, and three grains of quinine every four hours. On the 31st she was very prostrate, and had had no sleep during the night; she complained of pain in the shoulder and other joints. There were several large blebs on the fingers filled with purulent serum. On the feet, these blebs were more numerous; and on the heel and between the toes were very large. The respiration was 38; pulse 116, and compressible; there was a catching pain in the left side during the respiration. The abdomen was enlarged, tympanitic, and tender at the scrobiculus cordis. The urine was passed with difficulty; it contained mucus, and was rendered slightly turbid by heat. A grain of opium was given at once; and ordered to be repeated at night; the medicine to be continued, and the wine increased to six ounces. On April 1st she appeared much better, having had several hours of comfortable sleep. On the 2d she complained of severe pain at the lower part of the back, which she thought was due to commencing menstruation. The serum in the blebs on the fingers had become discoloured from admixture of the colouring matter of blood. The blebs were situated on the posterior part of the first joints of the fingers, and presented a zone of redness around the base. On the right side several vesicles were seen to-day, which were yesterday small raised papillæ. The blebs on the feet were as before. There was a systolic bruit over the region of the mitral valve; respiration 40; pulse 120, compressible. On the 5th she complained much of pain in the back; removing the clothes appeared at once to produce rigor; the stitch in the left side continued, and small crepitation could be heard at that part posteriorly. The bulla on the little finger had partially dried; the large one on the sole of the foot had burst; the abdomen was less distended, but slight tenderness continued. Wine increased to  $\text{℥xij}$ .

On the 6th she was not so well; there was considerable agitation, and some tremor; the tongue dry; the pulse irritable and compressible. The dyspnœa was also increased.

On the 7th greater prostration; she was in a soporose state, with occasionally muttering delirium; the eyes suffused; there

appeared to be increased general sensibility, so that she complained much when moved; the pain in the left side continued; the skin was congested; the eyes suffused; numerous sudamina had appeared on the chest and abdomen, and the pustules or blebs on the body were increased in size; the abdomen also was more distended; the tongue was dry and brown; the pulse 160, and respiration 40; there was also a small bed-sore. Wine  $\frac{3}{4}$ iv.

On the 9th increased prostration, muttering delirium, but with occasional consciousness; the blebs were drying up; the skin perspiring.

On the 10th she died at 10 a.m.

Inspection was made the following day. There was no evidence of external injury or abscess. *Brain*.—The membranes smooth; there was considerable venous congestion, but otherwise every part was healthy. *Chest*.—There was a small quantity of lymph on both the pleural surfaces, between the lobes at the posterior part of the lungs. The lower lobes were firm, but congested. The bronchial tubes were full of frothy mucus. *Heart*.—On the right side was firm clot, extending into the smaller branches of the pulmonary vessels; on the left side also there was a tolerably firm clot. On the auricular surface of the mitral valve there was slight roughness; and in one part, about three lines in diameter, greater roughness, as if a growth had been torn away. The ventricles were tolerably firm; there was a moderate layer of external fat, and in the pericardium slight excess of fluid. *Abdomen*.—The peritoneum was healthy; the intestines distended, especially the sigmoid flexure, the superior coil of which reached as high as the transverse colon and stomach. The ileum and glands, and the intestines generally, were healthy. The liver, gall-bladder, and pancreas, were also healthy. The spleen was of moderate size and firmness; at its inferior part was a small collection of softened fibrinous deposit, extending about an inch into the gland. In the kidney, on the same side, was a whitish pyramidal portion of similar character, extending from the surface to the pelvis of the gland, softened in the centre, and bounded by a firmer margin, about one eighth of an inch in diameter. The rest of the kidney was healthy. There was no disease of the abdominal parietes.



The ovaries were atrophied. The right Fallopian tube was obstructed at its uterine orifice by a small hardened mass, and was dilated into a cyst at its extremity. The uterus contained purulent mucus.

*Remarks.*—This case was admitted as one of severe ague; but it was at once evident that the daily paroxysms of rigor, heat, and sweating, were not of a miasmatic character; or, if so, were considerably modified by some other cause. Neither was there any evidence of ordinary fever; there were no maculæ or other indication of that disease. Slight pain in the limbs suggested the idea of rheumatism; but spinal disease, pyæmia, &c., often give rise to this symptom. It appeared probable that the disease was closely allied to pyæmia; the typhoid symptoms, the blebs upon the skin, containing at first serum, afterwards becoming opaque, and then some of them of the colour of blood, indicated such a character of morbid action. The slight pleurisy, the roughness of the mitral valve, and the secondary changes in the spleen and kidney, were not opposed to that idea. The pain in the side had the character of pleurisy, and the systolic bruit, as indicating cardiac affection, was easily explained; but the precise character of the disease is still very doubtful. Pyæmia is the name of a condition with generally well-marked symptoms; but it is probable that in other degrees of severity it comprehends many cases of so-called rheumatism, and probably also such as that narrated. Large blebs were developed on the skin, especially on the hands and feet. At first they resembled mere elevated papillæ, with reddened margin; but in about twenty-four hours were found to be vesicles, or bullæ, with an inflamed border. It could not be ascertained how long those on the hands and feet had existed before admission; but the association of these blebs with a febrile, and afterwards with a typhoid state, suggested the idea, that it was one of those cases which have been described as *acute pemphigus*. As to its cause, the patient was in extreme poverty; her husband was apparently a worthless fellow, and there was a statement that she had received a blow on the side; but the examination after death did not confirm this. The state of the Fallopian tube might perhaps have led to retained secretion, which assumed a morbid character;

and then led to a changed condition of the blood. The fibrin in the spleen and kidney were similar to those frequently found in disease of the heart, and the roughened state of the mitral might be regarded as confirmatory of the opinion that they arose from the obstruction of the vessels. The patient rallied considerably on the second day after admission; but afterwards became more and more prostrate till death, which took place on the eleventh day, or about twenty-five days from the commencement of the disease. The plan of treatment was throughout a stimulating one—wine, nourishment, quinine, and opiates to procure sleep—and the transient improvement encouraged the hope that she would recover. We have observed several instances of this kind; but always with the same unsatisfactory solution of their cause. One was lately under the care of my friend and colleague, Dr. Barlow. The patient was one of the nurses, and presented symptoms very similar to those detailed: large blebs formed, with typhoid symptoms; and death followed in about ten days. An abscess, found in the neck, came on some days before death; but was evidently of a secondary character, and the disease resembled fever, with pyæmia.

**CASE II.** — *Gonorrhœa; Slight Pain in the Knees; Pneumonia; Supposed Convalescence; Sudden Death from Ante-mortem Clots in the Pulmonary Vessels, in the Cavæ, in the Internal Iliac, and Prostatic Veins; Phlebitis.*

Samuel T—, æt. 19, was admitted into Guy's under my care, December 8th, 1858. He was a pale, muscular young man, and had been out of health about three weeks; but three or four days before admission he was seized with rigor, febrile excitement, and severe pain in the right side. He had a pungently hot skin, with short cough; and, on examining the base of the right lung, minute crepitation was audible, with some increase of the resonance of the voice; there was no dulness on percussion; at the end of the inspiration, on the same side at the base, slight (pleuritic) crackling sound was heard. The respiration very slightly accelerated; the pulse compressible, about 110; abdomen apparently healthy; no vomiting or pain; the bowels acted comfortably; the tongue

was slightly injected at the tip, and had a thin whitish fur in the centre. He complained on admission of slight pain in the knees and ankles; but not sufficiently severe to prevent him easily moving about. He had been engaged at work till a few days before admission; and, with the exception of an attack of fever seven years previously, had enjoyed good health. Saline treatment was given, and beef-tea and arrow-root.

On December 11th, he was much relieved; the cough and pain in the side had left him; the pulse was normal in frequency, but compressible. The small crepitation at the base of the right lung had disappeared; there was no marked dullness; the air entered the lung more freely; slight mucous crepitation was audible, but no increased resonance of voice. The signs of pneumonia at the base of the right lung had almost disappeared, and he was regarded as convalescent. Eggs were ordered for him, and fish diet.

On the 12th he told the nurse that he felt very comfortable; that it had been his best night since admission; he took his breakfast well. About ten a.m., he got up to go to the night-chair, and, after the bowels had acted, complained of faintness. He called to the nurse to prevent his falling, and was at once removed into bed; but was evidently dying, and in half an hour had ceased to breathe.

*Inspection* was made twenty-eight hours after death. The body was pale, well developed; rigor mortis was well marked; there was swelling of the lower extremities.

*Brain.*—The veins were very full of blood, and numerous points of blood in the brain-substance were unusually marked; the membranes and the brain-substance were, however, firm throughout; so also the medulla, pons, and crura. *Chest.*—The right pleura was adherent from base to apex, the left pleura healthy. The upper lobe of the right lung was healthy; the lower lobe was condensed, rather fleshy, but contained much air, and floated in water; one or two lobules were granular, pale, consolidated, and heavier than water; the whole lobe appeared to be recovering itself. The bronchial tubes contained a moderate quantity of mucus. *Heart.*—The pericardium was healthy; heart normal in size; the right ventricle was covered with a moderate amount of fat. The right

cavities were more distended than the left, and in the right ventricle, and extending into the branches of the pulmonary artery, was a long clot, dark in colour; in some parts the clot was paler, and had a fibrinous appearance towards the exterior, that is, on the exterior of the clot; it was also partially moulded to the pulmonary valves. On examining the pulmonary arteries *throughout the lungs*, Dr. Wilks found them filled with firm clot, which in some parts was evidently ante-mortem. The left side of the heart contained scarcely any blood, and no clot; the ventricle was contracted; the muscle firm and healthy; the valves were healthy throughout. *Abdomen*.—The peritoneum was healthy; the intestines moderately contracted. The mucous membrane of the stomach and intestines was congested, but otherwise normal; so also the liver; the hepatic veins were full of blood. The kidneys were in a similar congested state. The supra-renal capsules were healthy. On opening the vena cava at the lower part, immediately above the iliac veins, a well marked ante-mortem clot was observed, grayish in colour, and older than those observed in the pulmonary vessels. Tracing the iliac veins, the whole of the internal iliacs were found to be similarly filled, and the veins about the prostate contained the oldest clots; so that, on section, the albumino-fibrinous contents projected from the cut extremity of the vein. The mucous membrane of the bladder was of a pinkish colour; and on examining the penis abundant purulent secretion was found beneath the prepuce, &c.

*Remarks*.—This case appears to confirm the observations of Dr. Richardson, in reference to the formation and effect of the sudden formation of coagula on the right side of the heart, especially in connexion with acute disease. The formation of clot first took place from phlebitis of the prostatic veins, and was probably consequent on the absorption of morbid product from the inflamed mucous membrane of the penis; from the prostatic the disease extended to the iliacs, and then to the cava. From the inferior cava coagulation of blood probably followed in the right ventricle and in the branches of the pulmonary artery, leading to the sudden cessation of the pulmonary circulation, the syncope, and death in a very short space of time. The congestion of the liver, the kidneys, the

mucous membrane of the intestines, and of the veins of the head, arose from this obstruction on the right side of the heart; the empty, contracted state of the left cavities arose from a similar cause. In moderate degree this poisoned condition of blood sufficed to set up lobular pneumonia and pain in some of the joints; but, as long as the prostatic and iliac veins only were obstructed the general system was scarcely affected; and the patient was regarded as almost convalescent. In acute pneumonia the pulmonary vessels sometimes become occluded, from the circulation having almost ceased in them; but in such cases the inflammation is much more general and severe than in this case. In this patient the pneumonia was very slight; the use of moderate salines with spare diet for a few days was followed by a remission of the symptoms, till the sudden and fatal syncope came on. The occurrence of these symptoms with gonorrhœa is an interesting fact. Sir A. Cooper described cases resembling rheumatism, as produced by gonorrhœa, consisting of pain in the joints, with swelling and redness, and especially affecting the ankles and knees; and others do not hesitate to go a step farther, and to affirm that such symptoms arise from the absorption into the blood of noxious materials leading to change in the molecular or chemical states of the blood, in fact, producing pyæmia; in this case also phlebitis. Mr. Prescott Hewett related to me two instances where he had observed symptoms of severe pyæmia, of the ordinary character, produced apparently by gonorrhœa. This case tends to confirm such ideas, and to establish the fact that so-called gonorrheal rheumatism must, in some cases at least, be regarded, not as rheumatism, but as pyæmia. It also shows the importance of watching closely for the cause of acute disease in some predisposing condition, as in this instance of slight pneumonia, set up, not by cold or wet alone, but by absorption of morbid product. The order of the manifested symptoms appear to have been the gonorrhœa, then slight rheumatism and lobular pneumonia, as the result of a form of pyæmia; and occurring at the same time, possibly the cause of the pyæmia itself, inflammation of the prostatic and iliac veins.

CASES ILLUSTRATIVE  
OF THE  
TREATMENT OF RHEUMATIC FEVER.

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BY G. WHITLEY, M.D.

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THE object of this paper is to ascertain, as far as possible, by an examination of cases of rheumatic fever treated in the wards of Guy's Hospital by the different physicians during the last three or four years, what mode of treatment appears most frequently and most rapidly successful. Cases of acute fibrous rheumatism have been selected for this purpose because, in the absence of any exact knowledge on the subject of rheumatic affections generally, they are, perhaps, the most definite in their character, and the least obscure in their pathology.

Before entering upon this part of the subject, however, it may be well to review briefly the present state of our knowledge of the exciting causes and pathology of rheumatic fever.

The exciting causes usually mentioned as capable of producing rheumatic fever are cold and moisture; but it is not difficult to show that these causes, either singly or combined, are insufficient. Perhaps bodily fatigue, coincident with the above, may be regarded as the most frequent exciting cause. Thus it has been remarked by many writers that one of the most frequent determining causes of a rheumatic affection of any particular set of joints is over-fatigue of those joints. Now, if we look upon the heart as being virtually a joint, it

becomes easy to understand the liability of persons with irritable hearts to cardiac affections in rheumatic fever, a fact well worthy of notice in a practical point of view. The existence of a rheumatic diathesis is too generally admitted to call for further notice here.

When we proceed to inquire into the pathology of rheumatic fever, we are little better off than before. Several high authorities speak of acute rheumatism as being essentially a blood-disease, a theory which appears to receive much support from one of its most striking phenomena, viz., a great excess of fibrin in the blood. The other chief change observed in that fluid is the presence of a large quantity of uric acid. The evidence in favour of other important changes in the blood, such as an excess of lactic acid from checked cutaneous excretion, is too vague at present to be taken into account.

The excess of fibrin in the blood being assumed to be the most essential change observable in rheumatic fever, while the most striking symptom of the disease is an affection of fibrous tissues, especially the joints, consisting mainly in the exudation of fibrin, the question of the priority of the joint-affection or the blood-change presents itself as one of paramount importance. Here, I confess, I am inclined to adopt the view of Dr. F. T. Bond,<sup>1</sup> that the excess of fibrin in the blood precedes the affection of the fibrous tissues, though traumatic lesions, such as burns, no doubt produce a similar excess. To use Dr. Bond's own words, "Is the hyperinosis merely an effect of the reaction of the local disease upon the system at large, as is generally believed, or is it the primary source of the exudation, the causative agent of the latter, without which it could never exist? I believe this last to be unquestionably the true statement of the case, and shall endeavour to bring satisfactory evidence that it is so. Considered simply in a teleological point of view, the former supposition throws no light whatever upon either the economical object of the hyperinosis, or upon the mode of its connexion with the local affection; whereas, on the later hypothesis, it is highly probable, *à priori*, that an excess of fibrous plasma, rapidly accumulating in the blood to an amount which is incompatible

<sup>1</sup> 'On the Pathology of Rheumatism,' 1858.

with perfect health, should be attracted, as it were, out of the vascular system, in the shape of an exudation, to those tissues for which it has a physiological affinity—such a process, in fact, being no more than a mode of excretion.”

I take this opportunity of alluding to a point of great importance in the diagnosis of rheumatic fever, often mentioned by Dr. Addison, viz., the fact that the heart is not unfrequently affected before the joints or any other part of the body. Neither is it difficult to understand that this should be so, if we regard the exudations of acute rheumatism as being brought about by fibrous tissues acting as excreting organs, while an irritable heart assumes the position of a fatigued joint. Thus I have seen a case in which delirium was attributed to inflammation of the membranes of the brain, but in which the character of that delirium, together with an irritable state of the heart and want of clearness in the heart-sounds, without any positive *bruit*, induced me to venture upon a diagnosis of rheumatism, speedily confirmed by the supervention of pain and swelling of the joints.

The present inquiry being directed more particularly to treatment, I shall not do more than allude to Lehmann's ingenious theory of the possible existence of several (allotropic) varieties of fibrin, the physical or physiological relations of which to various fibrous tissues in the body may serve to determine the site of the exudations so common in rheumatic fever.

CASE I.—Elizabeth O—, æt. 27, admitted October 14th, 1857, under the care of Dr. Barlow. Had rheumatic fever at ten years of age, but apparently without any cardiac complication. Had a second attack five weeks before admission, and a relapse four days before admission, from exposure to cold.

On admission, there was heat and swelling of the large joints, sour perspiration, and scanty urine, loaded with lithates. Pulse 116. No abnormal heart-sounds. Ordered—

Potass. Acet., ʒss ;

„ Nitrat., gr. vj, ter die, ex Decoct. Hordei, ʒij.

Pulv. Dover., gr. viij, o. n.



October 15th.—Somewhat relieved; urine more abundant.

17th.—Better, pain and swelling almost gone; urine copious, and free from deposit. Pulse 100.

November 2d.—Continued to improve up to this date, when she left the hospital well, having had no heart-affection.

**CASE II.**—Sarah Ann C—, æt. 23, admitted October 21st, 1857, under the care of Dr. Barlow. Ill nine days. First attack.

On admission, anæmic, with a systolic murmur over the base of the heart. Pulse 116, full. Heat and swelling of large joints, with much pain.

*Haust. Sennæ c. Vin. Colch. et Sp. Ammon. co., āā ℥xx, stat. et rep. post hor. iv, si opus fuerit.*

*Opīi, gr. j, 4tis horis,*

when the bowels have been opened.

Under this treatment the patient appeared rather better October 24th, but became worse October 31st.

November 1st.—Bronchitis; no murmur over heart, but sounds not clear.

*Emp. Canth., sterno.*

November 5th.—

*Potass. Bicarb., ʒss, ter die, ex  
Decoct. Hordei.*

6th.—Less pain. Pulse 109, soft.

7th.—Much better. Tongue clean.

13th.—No pain or swelling of joints.

30th.—Went out well.

**CASE III.**—Ann W—, æt. 34, admitted November 18th, 1857, under the care of Dr. Addison. Ill one week. Had rheumatic fever twelve and five years ago, being laid up about six weeks each time, with cardiac complication on the last occasion.

On admission, wrist and elbows swollen and painful, systolic bruit in axilla and over surface of heart and aortic valves, distinctly audible behind. Pulse 90, full. Sour perspiration;

tongue furred; urine scanty, high coloured, loaded with lithates.

Succ. Limon.,  $\mathfrak{z}$ j, 4tis horis.

Pulv. Dover., gr. x, o. n.

November 19th.—Wrists worse.

20th.—Better generally. Continued to improve until November 30th, when she went out well as regards present attack.

CASE IV.—Sarah G—, æt. 48, admitted February 3d, 1858, under the care of Dr. Rees. Ill three weeks.

On admission, swelling and pain of most of the large joints; systolic bruit below the left nipple; pulse 84; urine rather high coloured.

Succ. Limon.,  $\mathfrak{z}$ ij, 6tis horis.

February 8th.—Much better, and continued to improve until March 1st, when she left the hospital cured.

CASE V.—Sarah B—, æt. 37, admitted October 8th, 1858, under the care of Dr. Barlow. Ill some days. First attack.

On admission, most of the large joints swollen and painful; urine scanty and high coloured; pain on pressure in epigastric region.

Potass. Bicarb.,  $\mathfrak{g}$ j, ex Decoct. Hord., ter die.

October 9th.—Great pain on pressure in epigastric region; pulse 114, very feeble.

Adde sing. dos. mist. Sp. Ammon. co.,  $\mathfrak{m}$ xv.

Hydr. Chlorid., gr. j;

Pulv. Opii, gr.  $\frac{1}{4}$ , 6tis horis.

10th.—Much better.

11th.—Pain in joints rather increased.

Potass. Acet., gr. xxv;

Potass. Niträt., gr. v, ex Decoct. Hord., ter die.

Rep. pil., 8tis horis.

Hæst. Sennæ c. Tinct. Colch.,  $\mathfrak{m}$ xx, cras mane.

12th.—Excessively purged. Pain in joints increased.

Omit. mist.

Tr. Opii,  $\mathfrak{m}$ xx, ex Julep. Ammon. statim et rep. vespere.

After this the purging ceased.

13th.—Pain in joints still intense. Pupil contracted.

14th.—Pain no better.

15th.—About the same.

Potass. Acet., gr. xxv ;

Potass. Bicarb., gr. x ;

Vin. Opii, ℥xij, ex Decoct. Hord., ter die.

Opii, gr. j, o. n.

17th.—Sleeps better, and has rather less pain.

20th.—Much better.

27th.—Continues to improve.

Adde sing. dos. mist. Potass. Iodid., gr. ij.

CASE VI.—Alice F—, æt. 16, admitted October 20th, 1858, under the care of Dr. Barlow. Has had previous attacks. Some days before admission got wet, and was seized with severe pain in right ankle.

On admission, larger joints swollen and extremely painful, with some redness ; sour perspiration ; urine high coloured.

Potass. Acet., ʒss ;

Potass. Nitrat., gr. vj, 4tis horis ex Decoct. Hord.

Pulv. Dover., gr. x, o. n.

October 23d.—Pain in joints somewhat less.

25th.—Still less pain and swelling.

27th.—Better altogether, but cannot sleep.

Opii, gr. j, ter die.

Rep. mist. bis die.

November 16th.—Has continued to improve up to this date, when she went out cured.

CASE VII.—Lucy E—, æt. 18, admitted November 29th, 1858, under the care of Dr. Addison. Ill ten days. Has had two attacks previously, but gives no history of cardiac complication.

On admission, pain in various joints and chest, with dyspnœa. Pulse 105 ; sour perspiration ; urine scanty and

high coloured. There is a slight friction sound just below the left mamma.

Potass. Acet., 3ss;  
Potass. Nitrat., gr. x, 4tis horis, ex  
Decoct. Hord., ʒij.  
Pulv. Dover., gr. x, o. n.

December 2d.—Much the same.

Empl. Canth. sterno.

3d.—Pain rather less. Has some diarrhœa.

Mist. Cretæ, ʒj, c. Tr. Opii, m̄v. stat. et rep. si opus fuerit.

4th.—Less pain in joints.

6th.—Much better, and continued to improve up to January 11th, when she went out cured.

CASE VIII.—Philip L—, æt. 15, admitted December 16th, 1857, under the care of Dr. Addison. Had rheumatic fever six years ago, and has had palpitation ever since.

On admission, nearly all the joints were painful and somewhat swollen; tongue coated; pulse 90, full.

Mist. Magnes. c. Magnes. Sulph., ʒj, c. Vin. Colchici, m̄xij, 4tis horis.

December 17th.—Pain worse.

Rep. mist.

Pulv. Dover., gr. v, o. n.

18th.—Less pain.

31st.—Continued to improve up to this date, when he left the hospital.

CASE IX.—William L—, æt. 13, admitted October 8th, 1858, under the care of Dr. Barlow. First attack. Ill five days.

On admission, right hand swollen and painful; knees slightly so. Pulse 90, full; tongue furred.

Hydr. c. Creta, gr. iv, statim.  
Ol. Ricini, ʒss, post hor. iv.  
Potass. Chlorat., gr. x, ex Decoct. Hord., ter die.

October 9th.—No better; left hand affected.

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10th.—About the same.

Hydr. Chlorid., gr. j;

Opii, gr.  $\frac{1}{2}$ , 6tis horis.

Rep. mist.

13th.—Much better.

26th.—Appears to have caught cold; has pain in one wrist, and slight pericarditis.

Empl. Canth. reg. cordis.

Potass. Acet., gr. x;

Potass. Nitrat., gr. v, ex Decoct. Hord., 4tis horis.

November 4th.—Much better, and continued to improve until he left the hospital.

CASE X.—John D—, æt. 20, admitted October 22d, 1858, under the care of Dr. Barlow. Ill four days. Has had several attacks previously.

On admission, almost all the larger joints affected. Tongue coated; slight double-friction sound.

Succ. Limon.,  $\mathfrak{z}$ iss, 4tis horis.

Pulv. Dover., gr. x, o. n.

October 24th.—Pains in limbs better.

25th.—Pain in chest and dyspnœa. Double-friction sound louder.

Hydr. Chlorid., gr. iss;

Pulv. Opii, gr. j, 4tis horis.

Potass. Acet.,  $\mathfrak{z}$ ss;

Potass. Nitrat., gr. x, ex Decoct. Hord., 4tis horis.

26th.—Dyspnœa increased. Pain all over chest.

Empl. Canth. reg. cordis.

27th.—Less pain in joints, and better generally.

November 17th.—After some return of pain in left knee, and dyspnœa for a few days, left the hospital cured at this date.

CASE XI.—William W—, æt. 30, admitted December 1st, 1858, under the care of Dr. Addison. Ill fourteen days. First attack fourteen years ago, without cardiac complication.

On admission, larger joints swollen, red, and painful; slight sour perspiration; pulse 100, full; urine dark-coloured, abundant.

Hydr. Chlorid., gr. v, statim.

Ol. Ricini, ℥ss, post hor. vj.

Liq. Ammon. Acet.,

Aq., āā ℥ss;

Vin. Colchici, ℥xx, ter die.

December 2d.—Bowels freely relieved; tongue coated. No better.

4th.—Better. Joints less swollen.

8th.—Continues better, with the exception of one wrist, which is still swollen.

10th.—

Succ. Limon. ℥j, 4tis horis.

From this time the patient continued to improve, and soon left convalescent.

CASE XII.—John G—, æt. 23, admitted May 27th, 1857, under the care of Dr. Gull. Ill seven days; commencing with lumbago, followed by pain in joints, profuse sweating, and high-coloured urine.

On admission, joints very painful; effusion into one knee; pulse 100, full; urine very high-coloured, and loaded with lithates; heart very irritable.

Succ. Limon., ℥ij, 3tis horis.

May 29th.—Much the same.

30th.—Somewhat improved, the joints being rather less painful.

June 1st.—Swelling and pain in joints much diminished.

3d.—Much better, but has passed no urine in last twenty-four hours.

4th.—Passed about a pint of urine. Continued to improve until June 10th, when he had a relapse.

10th.—

Succ. Limon., ℥ij, 3tis horis.

13th.—Much improved. To take the lemon-juice three times a day.

July 6th.—Went out cured, having had no heart-affection.

CASE XIII.—William M—, æt. 30, admitted October 10th, 1855, under the care of Dr. Addison. Ill five days. First attack.

On admission, tongue coated white; pulse 83, full; most of the large joints swollen and painful; slight pericardial rub.

Empl. Canth. regioni cordis.

Succ. Limon., ʒj, ter die.

Morph. Acet., gr. ½, o. n.

October 12th.—Rather better. Joints much the same.

Liq. Ammon. Acet.,

Aq., āā ʒss;

Vin. Colchici, ℥xxv, ter die.

Ant. Pot.-Tart., gr. ¼;

Pulv. Opii, gr. j;

Hydr. Chlorid., gr. iss, ter die in form. pil.

13th.—Much better. Joints less painful.

15th.—Much purged. Mouth rather sore. To omit pills, and to take—

Pulv. Dover., gr. x, o. n.

30th.—Continued to improve up to this date, when he went out cured.

CASE XIV.—William L—, æt. 14, admitted January 2d, 1856, under the care of Dr. Barlow. Ill seven days.

On admission, several of the larger joints swollen and painful; tongue much coated; urine high-coloured; first sound of heart rough.

Potass. Acet., ʒj;

Potass. Nitr., gr. viij, ex Decoct. Hord., 4tis horis.

Pulv. Dover., gr. viij;

Hydr. c. Creta, gr. ij, o. n.

January 3d.—Distinct rub with first sound of heart.

4th.—Rather better; rub more distinct over base of heart.

Ant. Pot.-Tart., gr. ¼;

Pulv. Opii,

Hydr. Chlorid., āā gr. j, ter die.

Haust. Sennæ, cras mane.

7th.—Going on well.

10th.—Not so well. Some pleurisy on right side.

Empl. Canth. lat. dextro.

12th.—Much better.

February 11th.—Continued to improve up to this date, when he went out cured.

CASE XV.—James K—, æt. 24, admitted November 5th, 1856, under the care of Dr. Barlow. Ill some days.

On admission, larger joints much swollen and very tender; tongue coated; bowels confined; second sound of heart rough.

Haust. Sennæ c. Tr. Colch., ℥xx, statim.

Potass. Acet., ʒss;

Potass. Bicarb., gr. x, ex Decoct. Hord., ʒij, 4tis horis.

November 6th.—Less pain in joints; profuse perspiration.

7th.—Much the same.

Empl. Canth. regioni cordis.

Hydr. Chlorid., gr. ij;

Pulv. Dover., gr. x, h. n.

Haust. Sennæ c. Tr. Colch., ℥xx, cras mane,

Rep. mist.

8th.—Better in all respects.

14th.—Swelling has migrated from joint to joint; bruit now a decided rub.

20th.—Improving slowly.

24th.—Return of swelling and pain in right wrist.

28th.—Complains only of weakness. Ordered some tonic medicine.

December 15th.—Went out by his own wish, much relieved, but with some pain in right wrist.

CASE XVI.—Ellen W—, æt. 17, admitted October 28th, 1857, under the care of Dr. Barlow. Ill four days. Slight systolic murmur under left nipple.

On admission, wrists and elbows swollen and tender, knees



and ankles rather less so. Pulse 100, full; tongue covered with brown fur.

M. M. c. dimid. M. S., ʒj;  
 Vin. Colchici, ʒxx, ter die.  
 Hydr. Chlorid., gr. iij;  
 Opii, gr. j, h. n.

October 30th.—Rather less pain in joints; some diarrhœa; murmur persistent.

Rep. mist. c. Tr. Opii, ʒiv, sing. dos.  
 Opii, gr. j, h. n.

November 2d.—Worse.

Empl. Canth. regioni cordis.  
 Hydr. Chlorid.,  
 Opii, āā gr. j, o. n.  
 Potass. Acet., ʒss;  
 Potass. Niträt., gr. v, ter die, ex Decoct. Hord., ʒij.

5th.—Improving, joints less painful.

19th.—Nearly convalescent, having continued to improve.

December 2d.—Left the hospital cured.

CASE XVII.—James L—, æt. 39, admitted November 4th, 1857, under the care of Dr. Hughes. Ill ten days. Has had several previous attacks.

On admission, pain and swelling of large joints. Profuse perspiration; pulse quick and full.

Potass. Bicarb., ʒss, ex Mist. Camph., ter die.

November 9th.—Less pain; pulse 76. Left the hospital a few days afterwards, cured.

CASE XVIII.—Thomas J—, æt. 24, admitted October 8th, 1858, under the care of Dr. Hughes. Ill one week.

On admission, pain and swelling of large joints; sour perspiration; urine high-coloured and scanty; pulse 100; bowels confined.

Pil. Col. c. Cal., gr. xv;  
 Pulv. Opii, gr. j, h. s.  
 Potass. Bicarb. ʒj, ex Decoct. Hord., 4tis horis.

October 11th.—Better.

20th.—Continued to improve up to this date, when he went out much relieved.

CASE XIX.—Joseph R—, æt. 34, admitted October 22d, 1858, under the care of Dr. Habershon. Ill one week. Second attack.

On admission, finger and wrist-joints swollen and painful; profuse perspiration; pulse 110, full; urine high-coloured.

Potass. Bicarb., ʒss, ex Decoct. Hord., 4tis horis.

Pulv. Opii, gr. j, o. n.

October 28th.—Much relieved in every way.

November 12th.—Being free from rheumatism, he was ordered

Mist. Quinæ, ʒj, ter die.

15th.—Had a relapse.

Rep. Potass. Bicarb.

28th.—Discharged cured, having rapidly improved from last date.

CASE XX.—George T—, æt. 31, admitted December 1st, 1858, under the care of Dr. Gull. Second attack.

On admission, feet and ankles swollen, and intensely painful.

Potass. Bicarb.,

Potass. Acetat., āā gr. xv, ex Decoct. Hord., ʒij, 6tis horis.

December 4th.—Much improved, feet less painful.

15th.—Went out, having continued to improve.

CASE XXI.—William M—, æt. 24, admitted May 14th, 1858, under the care of Dr. Hughes. Ill ten days. First attack.

On admission, larger joints swollen and painful; tongue coated white; pulse quick and full; urine scanty and high-coloured; sour perspiration.

Succ. Limon., ʒij, 6tis horis.

May 16th.—Less pain.

20th.—Much improved in all respects. Finds lemon-juice grateful.

24th.—Went out cured.

CASE XXII.—Mary G—, æt. 13, admitted May 16th, 1857, under the care of Dr. Wilks. A case of relapse, the patient having recently been in the same ward, under the care of Dr. Habershon.

On admission, several of the larger joints red, hot, swollen, and painful; pulse 112; urine scanty and high-coloured.

Haust. Sennæ ad sedes.

May 17th.—Bowels freely opened. Feels relieved.

Potass Bicarb., ʒss, 6tis horis, ex Mist. Camph.

19th.—Less pain.

June 9th.—Went out well, having improved steadily.

CASE XXIII.—Emily P—, æt. 14, admitted July 1st, 1857, under the care of Dr. Wilks. Has had several attacks previously.

On admission, larger joints hot, red, and very painful, with hot skin and sour perspiration. Pulse 96; tongue coated; heart's action irregular, with a systolic bruit; bowels confined; urine scanty and high-coloured.

Succ. Limon., ʒij, ter die.

Hydr. Chlorid., gr. j;

Pulv. Dover., gr. v, nocte manequ.

July 2d.—Worse; more pain.

4th.—Not much better; pulse 100, full.

6th.—Considerably better in all respects. Pulse 80, less full.

7th.—Mouth slightly affected, otherwise improving. To omit the pills and continue the lemon-juice.

14th.—Having omitted all medicine for some days, she suffered a complete relapse at this date.

Succ. Limon., ʒss, ter die.

18th.—Much better.

28th.—Another relapse.

Pot. Acet.,

Pot. Niträt., āā gr. v;

Tr. Opii, ℥v, ex Aquâ, ter die.

30th.—No better; shoulders especially painful; heart's action tumultuous, both sounds indistinct,

31st.—11:30 a.m. Became severely convulsed for fifteen minutes, with speedy recurrence. Ice to head.

Hydr. Chlorid., gr. v, statim.

Empl. Canth. nuchæ.

9 p.m.—Frequent repetition of fits; pulse 120, small and frequent.

August 1st.—Convulsions continued until two this morning; pain in joints less severe.

2d.—Better; pain much relieved; heart less irritable; systolic bruit again audible.

4th.—Continued to improve.

11th.—Went out convalescent.

We have here twenty-three cases of rheumatic fever of the acute fibrous kind, treated by various physicians and in several wards of the hospital. The number may appear small as a basis for any very definite conclusions as to treatment, but I was unwilling to occupy much space with a dry record, and may perhaps be allowed to add, that from my experience of a much greater number of cases, both in the hospital and elsewhere, I believe an examination of them would lead to the same conclusions.

In fifteen of these cases salts of potash were given, either at first or after the failure of other means. Where cardiac complications existed, these remedies were combined with calomel, antimony, and opium, and with blisters; while in some of the simple cases of joint-affection they were administered quite alone. In no case did they fail to effect a cure, which, even in severe cases, was sometimes attained very rapidly. The latter remark applies, indeed, to some recent acute cases treated with lemon-juice, but in many instances this remedy unfortunately proves ineffectual. The treatment with large doses of bicarbonate of soda not having, so far as I know, been employed at Guy's Hospital, I take this opportunity of giving the results of its use at the German Hospital, with the particulars of which my friend Dr. Hermann Weber has kindly furnished me. He has tried it in about sixteen cases. From six drachms to an ounce were given in the twenty-four hours. In five cases the effect was very marked; the pain and swelling ceased

within forty-eight hours; the pulse sank within the same space of time from between 100 and 125 to between 65 and 55, the temperature of the body becoming likewise much lower than before the administration of the remedy. On the third or fourth day the pulse sank sometimes still more, in one case as low as 45. The profuse watery perspiration was less perceptible, the tongue became cleaner, the urine, of course, quite alkaline.

The diminished frequency of the pulse remained for some days after the remedy had been left off, and disappeared only by slow degrees.

In five or six of the other cases, the administration of the bicarbonate was followed by an alleviation of pain and a diminution of the frequency of the pulse, but by no means to the same extent as in the cases already alluded to. In the remaining cases, the remedy did not seem to exercise any influence at all on the prominent symptoms of the disease.

The cases in which the remedy was most useful were young persons, in whom the disease was attended with much pyrexia, considerable pain, marked swelling, increased perspiration, and the peculiarly furred tongue. They were, therefore, instances of the well-pronounced acute type, while the cases in which there was no effect were less acute—less according to the normal type of the disease.

We have now to inquire into the mode of action of some of the remedies employed in rheumatic fever. All that we know with any certainty of the effect of large doses of lemon-juice is, that it soon diminishes the frequency of the pulse. It has been well shown by Dr. G. O. Rees how it *may* serve to facilitate the conversion of lithic acid, introduced into the circulation in excess as a consequence of mal-assimilation, into urea. Now, the two chief indications in the treatment of rheumatic fever are—

1. To prevent the formation of an undue amount of lithic acid, or to favour its conversion into urea.
2. To facilitate the elimination of the fibrin present in excess in the blood.

Even if we assume the reality of the action of lemon-juice suggested above, the latter indication remains unfulfilled.

Much the same may be said of colchicum, which "abates pain, purges, and lowers the pulse, *i. e.* is cathartic and sedative," as it is not borne out by facts that this remedy augments the quantity of lithic acid in the urine, though it may tend to prevent its formation in the blood.

Alkalies, on the other hand, not only act as solvents for lithic acid, but also dissolve fibrin. In addition to this, their neutral salts, especially those of potash, are diuretic. The latter, therefore, appear to me to unite more completely than any other known remedy all the properties requisite in the treatment of an attack of rheumatic fever unaccompanied by any affection of the heart or other important organ. Even where cardiac or other complications indicate the use of mercury, opium, blisters, or local depletion, these are only to be regarded as accessories, the simultaneous employment of the alkaline treatment seeming to afford the best prospect of a certain and speedy cure.

# LESIONS OF THE NERVOUS SYSTEM

PRODUCING

## DIABETES.

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By F. W. PAVY, M.D.

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IN the last number of the 'Guy's Hospital Reports' I published some conclusions to which my experimental investigations had conducted me, having the effect of controverting the views entertained by physiologists with respect to the production of sugar by the liver during life. In extending my researches during the past year, I have been led to follow out new paths of inquiry ; and I here propose to mention the facts that have been brought to light concerning the disturbances of the nervous system producing saccharine urine. I may previously state, however, that whatever fresh aspects have presented themselves for examining the views expressed in my last communication to the 'Reports,' the results obtained have been in the highest degree corroborative. Indeed, up to the present time, I do not know of a single fact standing in opposition to the conclusions that were there announced.

As far as our knowledge extends, it may be stated, that in the healthy liver, during life, there is a substance which I have in my former communication spoken of under the term of hepatine. This substance, in its chemical bearings, is exceedingly like dextrine, and prone to most rapid transformation into sugar when in contact with complex nitrogenized animal materials. In the liver, after death, this transformation takes place ; but in the liver, naturally, during life, there seems a force, or a condition, which overcomes the chemical tendency

to a saccharine metamorphosis, and the hepatic undergoes some other change than conversion into sugar, on which I hope to have something to say at a future period.

After the ordinary destruction of life, sugar makes its appearance with such astonishing rapidity in the liver, that this organ has been erroneously supposed to be strongly charged with a saccharine principle during life. But, beyond the liver, and the blood which escapes from it during the continuance of the circulation in the act of death, no sugar is to be discovered in the system. If, however, the circulation be mechanically kept up—if, for example, an animal be pithed, and artificial respiration be resorted to, to allow the heart's action to continue; then, the sugar formed as a *post-mortem* effect in the liver, is carried from it, and distributed through the system, to be eliminated with the urine. I last year mentioned an experiment in proof of this assertion, and it is upon this fact that I will now alight to start from.

The following is a record of a couple of experiments in which different parts of the medulla oblongata were destroyed. In the first, the lower part of the medulla was divided; in the second, the medulla was destroyed about its centre. Saccharine urine was the result in each.

*Division of the lower part of the Medulla Oblongata ;  
Artificial Respiration ; Saccharine Urine.*

*Experiment.*—In a healthy dog, between five and six hours after a meal of animal food, the pithing instrument was inserted between the occipital bone and the atlas, and carefully moved from side to side, so as to destroy the *medulla oblongata* without wounding the vertebral arteries. Scarcely any hæmorrhage resulted. My apparatus, consisting of a double pair of bellows (one for forcing air into the lungs, the other for drawing it out), worked by a lever, was instantly adapted to the trachea, and artificial respiration was performed. The heart's action continued forcible and regular, and the pulsation of the superficial arteries was very perceptible. The animal's body was completely paralysed and insensible, but its head seemed alive and natural. It evidently took notice of objects with its eyes, and appeared, in fact, to look rather watchfully about. The



conjunctiva retained its natural sensibility to impressions. A large quantity of saliva flowed from the mouth during the whole performance of the experiment, but the animal was observed not unfrequently to swallow with ease. The urine was tested before the operation, and gave no reaction of sugar. The urine collected an hour after the operation gave a strong indication of the presence of sugar, requiring, however, protracted boiling with the Barreswil solution to bring it out, on account of the urine being so strongly charged with ammoniacal compounds, as is usually the case after operations of this kind on the brain and the medulla. As soon as the artificial respiration was discontinued the circulation stopped, on account of the animal being unable to breathe for itself. Subsequent dissection showed that the destruction of the *medulla* was effected opposite the point of divergence of the two posterior pyramids.

*Destruction of the Medulla Oblongata through its centre ;  
Artificial Respiration ; Strongly Saccharine Urine.*

*Experiment.*—An hour and a half after a meal of animal food, the *medulla oblongata* of a good-conditioned dog was crushed near its centre by inserting a pithing instrument through the occipital bone just behind the occipital protuberance, and afterwards cautiously moving it about. The apparatus for artificial respiration was adapted, and artificial respiration performed. The animal appeared completely dead, with the exception of the heart's action continuing. The eye was fixed, and the conjunctiva totally devoid of sensation ; and no excito-motor phenomena of any description could be elicited. Although the heart's action was at first vigorous, yet it afterwards got more feeble ; its impulse, however, was to be seen between the cartilages of the ribs as long as the respiration was kept up. The urine removed before the experiment gave no trace of saccharine reaction. The urine collected an hour and a half after the destruction of the *medulla*, gave a strong reaction—a copious yellow reduction with the Barreswil solution. Upon dissection, it was seen that the lesion in the *medulla* was effected as near as possible through its centre.

I consider, unquestionably, in these experiments, that the saccharine urine resulted from the ordinary *post-mortem* change in the liver, furnishing sugar, which was carried by the circulation to the kidneys, thence to be discharged by their action. Now, notwithstanding the destruction of the *medulla oblongata* leads to this effect, yet such is not the case with the *medulla spinalis*. I have repeatedly divided the spinal cord, but have never thus produced diabetes. I have gone as high as between the second and third cervical vertebræ; after which, of course, artificial respiration was required to maintain the circulation, as after the destruction of the *medulla oblongata*. With regard to the brain (*cerebrum*), I am not enabled to speak in such positive terms; but my opinion is, that its functions may be completely destroyed without placing the liver in the condition, noticeable, after actual death, or after lesion of the *medulla oblongata*. There are circumstances, in operating on the brain, which render the interpretation of the result a little difficult. The *medulla oblongata* may be implicated, as it were, by concussion. The great loss of blood frequently attendant on opening the skull may so enfeeble the circulation, that if sugar were formed in the liver it would scarcely be carried in any notable extent to the kidneys. Again, the laboured respiration following severe lesions of the brain may, by impeding the circulation and occasioning congestion of the liver, determine the presence of sugar in the blood, just as I have shown mechanical obstruction of the respiration, without any injury of the nervous system, will do.

In two experiments which I performed close upon each other, after the administration of chloroform, the cranium was exposed and trephined, and a considerable sized piece of bone in front of the occipital protuberance chipped away. In both cases there was a great loss of venous blood, so much so, as almost to threaten death from hæmorrhage. The *dura mater* being slit open, the posterior lobes of the brain were raised, and by means of the handle of a scalpel the *cerebrum* was severed from its connexions, just in front of the *pons varolii*. In the one instance the respiration immediately stopped, and had to be kept up artificially. Whilst this was done, the heart's action continued, although so feebly that it was not to

be felt through the thoracic parietes. The left conjunctiva remained sensitive to impressions, and the right eyelid at first feebly responded to irritation of the conjunctiva, but shortly afterwards remained immoveable, and the eye appeared quite dead. About half an hour after the operation, there were movements as of attempts to vomit, which occasionally recurred for a quarter of an hour. Then the left eye became insensitive, the animal lay quite motionless, and the legs were flaccid. There was no sign of life to be observed, with the exception of the persistence of the heart's action. The urine yielded no evidence of containing sugar. But, a piece of the liver sliced off, whilst the circulation was in action, and about ten minutes after the last trace of animal life had been extinguished, gave a very strong reaction, after treatment with potash instantaneously on removal to preserve its condition unchanged. In the other instance, the operation momentarily checked the respiration; but afterwards the breathing was carried on naturally, without assistance. The heart's action was so feeble that it was scarcely to be perceived, a circumstance that I attributed to the great loss of blood that had been sustained. In a little more than an hour, the urine was removed and tested, and gave no indication of saccharine impregnation. Pressure was made upon the exposed brain, to occasion death; and immediately afterwards the abdomen was opened, and a piece of the liver cut off and treated in the same way as the other. It yielded scarcely an appreciable trace of saccharine reaction.

The urine, it will be observed, was in both these experiments alike devoid of sugar, but I have reason to think, had it not been for the great loss of blood, that it would have been saccharine in the first, on account of the liver being found strongly charged with sugar, and from the fact that in other operations ordinarily producing diabetes, I have not unfrequently noticed an absence of that effect where great hæmorrhage has been occasioned. There was this important difference in the results of the two operations, which led, I consider, to the difference in the state of the two livers, namely, that in the first, the functions of the *medulla oblongata* were destroyed, as proved by the cessation of the respiration, whilst, in the second, the *medulla* remained in a state of functional activity.

To show the varying character of the results of operations on the brain, arising, I believe, from incidental secondary disturbances, I may refer to another experiment, which I performed a short time after those I have just mentioned. An oldish fat dog, about two hours after a meal, was placed under the influence of chloroform. The two carotids were picked up and tied, to restrain hæmorrhage in the subsequent part of the operation. The skull was trephined on one side, towards the posterior part; and, the *dura mater* being opened, the handle of a scalpel was passed to the base of the skull, and moved across from one side to the other, so as to cut through the *crura cerebri*. There was scarcely any hæmorrhage, none, in fact, that could possibly be considered of any account. The respiration was much disturbed, but not arrested. It was of a convulsive character. The limbs were thrown into a rigid state. The urine, before the operation, gave no trace of saccharine reaction. The urine, two hours afterwards, gave a moderate indication of the presence of sugar. Dissection showed that the *crura cerebri* were divided immediately in front of the *pons varolii*.

In this experiment the respiration was throughout materially affected. The *medulla oblongata* and *spinalis* seemed both to be thrown into a violent state of irritation, for, besides the spasmodic or convulsive kind of breathing, there was a state approaching tetanic rigidity of the whole body. In cutting through the brain I made two incisions. My first was much further forwards than I desired; I felt almost confident, by the phenomena manifested during life, that it was so; I therefore, a few minutes later, made a second, which passed immediately in front of the *pons varolii*. The state, even after this, was very different to what I remarked in the other experiments, and was, I presume, occasioned by the persistence of an impression on the spinal system, produced by wounding the cerebral ganglia, as I did at first. I think the moderately saccharine urine observed two hours after the operation is to be accounted for by the disturbance of the breathing. (I have on a previous occasion shown, that a simple mechanical disturbance of the breathing, without any lesion of the nervous centre, is quite sufficient to lead to the presence of sugar in the system; and if anything further were wanting, I might

state that I have more recently found that even a strongly-marked diabetes may be occasioned in this way. Not a long while ago, I muffled the head of a dog in a bladder with a piece of glass tubing tied in it, so as to be able to regulate the supply of air as I liked. I only allowed just sufficient to keep the animal alive, conscious, and able to move about. The urine was examined before anything was done, and proved to be free from sugar; whilst the urine withdrawn after an hour's obstruction of the respiration, proved to be very strongly saccharine, giving an orange-yellow reduction with the Barreswil solution, after a little boiling to drive off ammonia, which was evolved to a large extent.) Had the removal of the influence of the brain placed the liver in the same condition as it is after death, or after destruction of the *medulla oblongata*, I should have expected that the urine at the end of two hours would have been very much more saccharine than it was.

Whilst writing these remarks upon this subject, I thought it might be rendered more complete by undertaking another experiment. I will describe fully that which I have just performed, observing that the operation was as uncomplicated, and the result as conclusive, as any that I could hope to obtain. It fully confirms the inferences drawn from the experiments that have been already mentioned.

*Separation of brain from medulla oblongata by division of the crura cerebri; no diabetes.*

*Experiment.*—April 9th, 1859.—A large and powerful, exceedingly healthy-looking dog, was placed under the influence of chloroform about four hours after a full meal of animal food. The two carotids were cut down upon, and ligatured to control the bleeding during the subsequent steps of the operation. The skull was trephined on either side, underneath the posterior and upper part of the insertion of the temporal muscle. The pieces of bone being removed, the *dura mater* was opened by crucial incisions; and, by means of a director, the brain was completely separated in two, from one side to the other, about opposite the centre of the base of the skull. There was remarkably little hæmorrhage. The animal was immediately

thrown into a quiet unconscious state; the fore legs were a little stretched out, but the hind legs were quite flaccid. At no time whilst the operation was about, did the respiration seem in danger of being arrested. The breathing afterwards was exceedingly quick and short, and was frequently attended with a sigh. The heart's action was extremely rapid, the pupils were dilated, and the third eyelids drawn in front of the globes. Unless forcibly held open, the eyelids remained closed, and when the neighbourhood of the eye was touched it produced a winking movement of the *orbicularis*, showing that the excito-motor system was intact. When the closed eye was rather violently struck with the flat blade of the scalpel, it called forth a movement of the whole head, as if of flinching under the application of the blow. In an hour and a quarter's time from the completion of the operation, some urine was removed by a catheter; it gave no reaction of sugar. On dissection it was found that the brain was completely divided just in front of the *pons varolii*; the *cerebrum*, in fact, was so detached, that it came away alone, on removal of the brain, leaving the *medulla oblongata*, *cerebellum* and *pons varolii*, quite entire and untouched, the section being through the middle of the *crura cerebri* and the aqueduct of Sylvius.

Poisons deadening the cerebro-spinal system, without arresting the heart's action, occasion the same state as if the animal were absolutely dead. The chemical metamorphosis of hepatine into sugar takes place in the liver, and the sugar formed, is carried by the circulation, maintained by artificial respiration, to the kidneys, whence it appears in the urine. Bernard has shown that after the Woorali poison a diabetic state of the urine is produced on performing artificial respiration to keep up the action of the heart and thus the flow of blood. According to my own experience, strychnine produces precisely the same. The following is the description of an example of this kind.

*Poisoning by strychnine; artificial respiration; diabetes.*

*Experiment.*—A healthy dog, at a period of full digestion, was taken. Strychnine, dissolved in water acidulated with acetic

acid, was injected into the subcutaneous tissue of the back. In about a minute's time, and without any premonitory sign, the animal was seized with a convulsion which stiffened its body out, and stopped its breathing. The apparatus for artificial respiration was immediately adapted to the trachea, and thinking the walls of the chest might be too rigid to allow of the necessary movement of the lungs, an opening was made into the pleuritic cavity on each side, by which a free ingress and egress of air was permitted around the lungs, so that their expansion and collapse could readily take place. Artificial respiration was performed, but the animal did not regain its consciousness; neither was there any subsequent general convulsion, but it remained on its back as it was placed, and manifested a spasmodic starting or jerking of the legs and body, which recurred at the rate of about twenty times a minute, and continued as long as the artificial breathing was kept up. The heart acted vigorously till the respiration was discontinued. The pupils were greatly dilated, the eye became covered with a film, and thus presented the appearance of death. No sign of a reflex movement could be obtained. At the end of an hour and a half the urine was collected, and gave an intense reaction of sugar—an orange-yellow reduction with the Barreswil solution.

Looking to the results I have been quoting, a natural inference seems to me to be, that the cerebro-spinal system gives to the liver a force or a condition which it does not possess after death—a power of checking the chemical tendency of hepatine, whilst in the liver, to be transformed into sugar. And, further, from the same results, and from the effect of Bernard's puncture of the fourth ventricle in producing diabetes (which, I view, as destroying instead of stimulating nervous action), the part of the cerebro-spinal system connected with this object appears to be the *medulla oblongata*. Regarding the *medulla* under this light—regarding it as a centre, either directly presiding over the functional activity of the liver, or indirectly affecting it, by altering, through the medium of another or other organs, the condition of the blood going to it, I endeavoured to establish upon positive grounds the channel by which its influence might be

transmitted downwards. It was working upon this notion (whether the notion itself may ultimately prove right or wrong) that brought me to discover how a lesion of certain parts of the sympathetic system most rapidly produces diabetes.

Presuming the *medulla oblongata* to form a centre, giving to the liver a force preventing the saccharine metamorphosis of its hepatine, I knew the spinal cord could not constitute, at least alone, the passage for the transit of this force, because, after division of the cord, the liver remains in an ex-saccharine state. Neither could it be through the pneumogastrics, for these have been over and over again divided, without the production of diabetes. But I had not tried the effect of dividing both cord and pneumogastrics together; I therefore performed the following experiment, the result of which was the same as if the cord alone had been divided.

*Division of spinal cord in the cervical region and of both pneumogastrics; no diabetes.*

*Experiment.*—A dog, having been placed under the influence of chloroform five hours after a full meal of tripe, the two pneumogastrics were cut down upon and about half an inch of each removed from the middle of the neck. The spinal cord was next crushed from behind, between the third and fourth cervical vertebrae. The apparatus for artificial respiration was adapted, and artificial respiration performed. There was loss of voluntary power and sensation in all the parts of the body below the neck, but the head appeared like that of a living and conscious dog. The eyes followed me about, evidently watching my movements. The conjunctiva retained its ordinary sensibility, and the animal closed its eyes when a blow was threatened to be inflicted. The head was sometimes tossed about, as if attempts were being made to move away. The process of swallowing was repeatedly performed. In the lower parts of the body reflex movements were strong upon the application of a stimulus. The urine had been drawn off from the bladder before the operation, and after the artificial respiration had been kept up and the heart's action well sustained for an hour and a quarter, it was found that a considerable quantity had again accumulated, which gave not the slightest trace



of saccharine reaction. A piece of the liver was now removed before the circulation had stopped, and instantly treated with potash to prevent the *post-mortem* transformation of its hepatic taking place. The product did not yield me the slightest vestige of indication of the presence of sugar. The liver, placed aside till the following day, and then tested, gave the usual *post-mortem* reaction of healthy liver—a most copious orange-red reduction with the Barreswil solution.

My next step was to determine the effect of dividing everything belonging to the nervous system passing through the neck, which, I did, by performing decapitation. The result was a strongly marked saccharine state of the urine. The following is an account of the experiment.

*Decapitation ; artificial respiration ; saccharine urine.*

*Experiment.*—The two vertebral and carotid arteries of a dog which had been recently fed, were securely tied at the lower part of the neck, for the purpose of checking hæmorrhage during the subsequent part of the operation. The animal as yet manifested very little disturbance; but to be sure that this preliminary step did not produce any effect on the urine, an hour was allowed to elapse, and a catheter then introduced into the bladder. The urine withdrawn gave no trace of saccharine reaction. The cord was now divided between the second and third cervical vertebræ, and, afterwards, complete decapitation effected opposite the same point. The respiratory apparatus being adapted, artificial respiration was performed, and the circulation thus kept up. There was not much blood lost during the operation. The muscles of the thorax and the fore legs exhibited a constant quivering movement; and, upon a slight impression, the latter were forcibly stretched out, as if in a state of tetanic rigidity. At the end of three quarters of an hour the abdomen was opened, which threw the whole body into a tetanic convulsion. There was only a small quantity of urine in the bladder. Tested with the Barreswil solution, it immediately gave an orange-yellow reduction.

This experiment stood in support of the idea I had formed concerning the *medulla oblongata* and its influence over the

natural action of the liver, and increased the probability of finding some discoverable channel of communication between the two. Seeing that this channel was not through the spinal cord or the pneumogastrics, I was at a loss to understand where it could be, if not through the sympathetic. Now, section of the carotid sympathetic is an operation which has been frequently performed by physiologists, and no one, that I am aware, has spoken of it as leading to the production of diabetes. But there is another part of the sympathetic system running through the neck, namely, the filaments accompanying the vertebral artery. These I determined to operate on; and in my first experiment I obtained a most strongly marked diabetes.

Since the period of making this discovery (December, 1858), I have followed up the inquiry with a great number of experiments, and purpose now communicating the facts I have arrived at. I forbear at present entering into any theoretical explanation of the way in which lesions of the sympathetic system act in producing diabetes. I thought, at first, that it was simply by cutting off the influence of the *medulla oblongata* from the liver. I cannot say that such will not prove actually to be the case; but there are certain phenomena which tend to show that there is something yet to be discovered beyond this. Our knowledge of the sympathetic is so imperfect, and its connexions so numerous, that it is not surprising to meet with difficulty in comprehending the reason of all that we observe in experimenting upon it. The *modus operandi* of these lesions in producing diabetes is still engaging my special attention, and I do not despair of ultimately arriving at something definite. I will, therefore, here confine myself, simply to the results made apparent by an examination of the urine, leaving out of consideration altogether, all questions as to the seat and nature of the changes, on which the phenomenon of saccharine urine is dependent.

Commencing at the point where I first attacked the sympathetic, namely, the portion accompanying the vertebral artery at the lower part of the neck; I will afterwards follow it upwards towards the head, and then downwards through the chest towards the abdomen. The animal that I have generally operated on has been the dog—the healthy dog,

kept upon an animal diet and taken at a period of full digestion. But I have also made some experiments on the rabbit; and these, I will place together, and speak of by themselves.

The accompanying sketch gives a representation of the sympathetic in the dog, as far as it bears on the experiments now brought forward. The superior thoracic ganglion is a large body lying just within the upper part of the chest. Besides its connexions with the few upper intercostal nerves and with the sympathetic trunk below, a couple of branches pass forwards to join the pneumogastric, and other branches ascend just in front of the head of the first rib, and by the side of the *longus colli* muscle to the vertebral canal in the line of transverse processes of the cervical vertebræ. These ascending branches (usually a couple of largish-sized nerves on each side, one of them lying on and supplying the *longus colli* muscle) may be easily reached in the living animal. They lie behind and to the inner side of the vertebral artery, and are best found by taking, as a guide, the head of the first rib. Their division causes an intensely saccharine urine in an exceedingly short space of time. Although the pleura is not opened in the operation, yet the severest form of pleurisy is set up, which proves rapidly fatal to the animal. This phenomenon results directly from the lesion of the sympathetic, for when the same operation is made, as far as contiguity to the pleura is concerned, without an actual division of the nerves, no pleurisy has been ever, according to my experience, set up. I think I shall best communicate what I desire to represent, by giving, as concisely as possible, the details of a few experiments on this point.

*Division of the ascending branches of the superior thoracic ganglion on both sides; saccharine urine.*

*Experiment.*—December 23d, 1858.—A healthy dog, which had been fed at 11 a.m., was, at 3.30 p.m., placed under the influence of chloroform. An incision was made in the median line of the neck, and the *sterno-mastoideus* muscle raised so as to reach the upper opening of the chest. The sympathetic filaments, running up on each side from the superior thoracic ganglion to the vertebral canal, were searched for and torn through with a curved, blunt-pointed instrument. The vertebral

arteries were left without disturbance, and neither pleural cavity was opened. When the animal came round from the effects of the chloroform, there was nothing unnatural to be noticed in its appearance. The urine voided during the administration of the chloroform gave no reaction of sugar. The urine withdrawn by catheterism *half an hour* after the operation gave an intense reaction—a copious yellow reduction with the Barreswil solution.

December 24th.—The dog took milk pretty freely, and seemed pretty well. The urine collected in the afternoon gave no indication of the presence of sugar.

December 25th.—The animal was quiet, and looked shy. It got feeble towards the evening, and was found dead the next morning.

*Post-mortem examination.*—The *pleura costalis* on both sides of the chest exceedingly injected, and each pleural cavity found to contain a large quantity of plum-coloured, purulent-looking fluid. Where the pleura lay in contact with the pericardium there was the same vascular appearance to be observed, but the pericardium inside was in a natural state, and only contained a small quantity of clear serous fluid. The *pleura pulmonalis* was perfectly free from injection or any sign of inflammation. All the viscera in the abdomen looked natural. The liver gave no trace of saccharine impregnation.

*Division of the ascending branches of the superior thoracic ganglion on one side; slight diabetes; subsequent division on the other side; strong diabetes.*

*Experiment.*—In a strong dog, about four hours after taking food, the ascending branches of the superior thoracic ganglion on the left side were divided. The urine before the operation gave no reaction of sugar. The urine *an hour and a half* after the operation gave only a trace—but an unmistakeable one—of saccharine reaction. The corresponding sympathetic branches on the right side were now divided, and in *half an hour's* time the urine gave an intensely saccharine reaction. On the following day the animal died. There was no urine in the bladder to test, but the liver was found entirely free from sugar.

The *pleura costalis* on each side presented a most injected appearance, from which, however, the *pleura pulmonalis* was free. Each pleural cavity contained a smallish quantity of a plum-coloured opaque-looking fluid.

*Ineffectual attempt at a division of the ascending branches of the superior thoracic ganglion, first on one side and afterwards on the other ; no diabetes.*

*Experiment.*—In a large and healthy dog the operation was made for the division of the ascending branches of the superior thoracic ganglion on the left side. The day was so dark and foggy that it was impossible to see well what was actually being done. The urine, up to three hours afterwards, gave no trace of saccharine reaction. The same operation was now attempted on the other side, and the urine, an hour afterwards, was still free from yielding a decided reaction of sugar, although it now behaved as if containing a minute trace of it. The urine collected on the following day gave no vestige of reaction. The life of the animal was destroyed. There was no unnaturally vascular appearance about either pleura, neither was there any unnatural collection of fluid in their cavities. On dissection, it was found, that the upward branches from the superior thoracic ganglion entirely escaped division on the left side. On the right side, the branch lying on, and giving filaments to, the *longus colli* muscle was torn through, whilst the other one remained undivided.

In the first of these three experiments, the vertebral sympathetic was divided at once on both sides, and in half an hour's time the urine had become most strongly saccharine. In the second, the division being practised on the left side only, the urine, at the end of an hour and a half, was only just traceably saccharine ; whilst the division being then effected on the other side, gave to the urine in half an hour's time a highly saccharine quality. The third experiment, although yielding only a negative result, I look upon as of decided interest. The nerves on the left side escaped division, and there was no appearance of sugar in the urine. Three hours afterwards, one of the

nerves on the right side was torn through, the other escaped; and an hour after this, the urine, if it contained any sugar, did so only to the extent of the merest trace.

Having noticed this effect arising from division of the vertebral sympathetic at the lower part of the neck, I determined to follow the nerve up in the vertebral canal, and endeavour to make out its connexions above. Curiously enough, in doing this, what I first resorted to, as a preliminary operation simply to restrain hæmorrhage, proved afterwards, to be an indispensable item in the production of a diabetic effect. I considered it was useless in the living animal to attempt to find and divide the sympathetic filaments only, in the vertebral canal; and I thought that on dividing the vertebral arteries and leaving them to bleed, (for I did not see how they could be ligatured in their canals,) there would be a most profuse, if not, a fatal hæmorrhage. I therefore, in my early experiments, tied the two vertebrae before their entrance into the foramina in the transverse processes of the cervical vertebræ; and also the two carotids, on account of the freedom of anastomosis which exists at the base of the brain between these two pairs of vessels. This operation of itself, when carefully performed, does not lead to the production of saccharine urine; but, *with it*, I almost constantly produced diabetes, on dividing also, the contents of the two vertebral canals in any part of their course; whilst, *without it*, I have always failed in finding division of the contents of the vertebral canals lead to such effect. I was very much puzzled at one time to make out anything at all definite or consistent on this point, but I think my experiments now pretty satisfactorily show what are the real facts of the case. At all events, I will bring the principal features of the experiments themselves forward, to enable others to judge of their meaning as well as myself.

I will premise by saying that the sympathetic of the dog differs to some extent in its anatomy from that of the rabbit and the human subject. I have only here, however, to speak of the dog; and, of that portion of its sympathetic which belongs to the region of the neck. The branches, to which I have before referred, running upwards from the superior thoracic ganglion, after entering the vertebral canal soon become exceedingly difficult to follow out; they can be seen,

however, distinctly to join with the lower cervical nerves, as these cross by them in their escape from the spinal canal. In front of the vertebral column, and immediately below the skull, there is a largish and dense, rather oval-shaped, gray-coloured body, lying in close proximity to the pneumogastric nerve; this body gives off branches below,—one, a distinct white fasciculus, which joins the pneumogastric; and others, gray, which pass to and ramify along the carotid artery. The fasciculus which joins the pneumogastric runs with it to the upper part of the chest, where it then seems to leave it and enter the superior thoracic ganglion: at least, a couple of nerves may be observed to pass off from the pneumogastric at the lower part of the neck and to throw themselves into the thoracic sympathetic. These anatomical points will be found represented in the sketch that has been already referred to.

Although a careful deligation of the vertebrae and carotids is unattended with the production of diabetes; yet when the carotids have been tied, it would seem that a rather free use of the director in isolating and picking up the vertebrae is sufficient to occasion strongly saccharine urine, notwithstanding the two ascending branches of the superior thoracic ganglion may remain perfectly untouched. At least, this appears to be the explanation of the fact, that in two instances after the operation of deligation of the carotids and vertebrae, I have noticed the production of a strongly marked diabetes; whilst in numerous other instances of the same operation I have met with an absence of any effect. Of the two instances referred to, one was the original experiment of the kind that I made, and a considerable amount of tissue surrounding the vertebrae was included in the ligature; whilst in the other, a little difficulty arose in alighting upon the vessels, and a rather rough treatment of the surrounding tissue was the consequence. After all the operations where no saccharine urine was observed, the vertebrae were neatly isolated and tied, with scarcely any disturbance of the surrounding tissue. Such, I say, is the only way in which I can account for the difference in my results; and careful dissection displays, besides the two conspicuous ascending branches of the superior thoracic ganglion, some minute filaments (one is represented in the sketch), which lie in close contiguity to the vertebral arteries.

On the lesion or escape then of these filaments, I imagine the whole to depend.

Here are the leading particulars of six experiments where, after deligation of the carotids and vertebrals, no diabetes resulted, and also the two instances referred to where I encountered a diabetic effect.

*Deligation of carotid and vertebral arteries ; no diabetes.*

*Experiment.*—A very strong, healthy-looking dog, fed at 11 a.m., and operated on at 3 p.m. Under the influence of chloroform the two vertebral arteries were very carefully picked up and tied. The two carotids were also isolated and ligatured. The operation gave rise to scarcely any appreciable disturbance. In fifty minutes' time the urine did not contain a trace of sugar.

*Experiment.*—A very healthy and large-sized dog. Under chloroform, and during digestion, the two vertebrals were neatly surrounded by ligatures, and afterwards the two carotids. When an hour had elapsed some urine was withdrawn, which gave no sign of saccharine reaction.

*Experiment.*—An ordinarily healthy-looking dog. Three hours and a half after taking food. Under the influence of chloroform, a careful deligation of the two vertebrals and carotids was performed. Urine, a little more than an hour afterwards, presented not the slightest appearance of the presence of sugar.

*Experiment.*—A healthy dog. After the administration of chloroform the two vertebrals and carotids carefully tied. The urine, an hour and a half afterwards, furnished no trace of the presence of sugar.

*Experiment.*—A dog, strong and healthy enough in appearance, but having refused to-day to take the usual amount of food. An hour after carefully tying the two vertebrals and carotids the urine remained perfectly devoid of sugar. The life of the animal was afterwards destroyed, and the liver, some time after death, yielded a strong reaction of sugar, showing that the organ was in a natural state.

*Experiment.*—A good-conditioned dog, nearly four hours after a meal of animal food. Careful deligation of the verte-



brals and carotids performed. No trace of sugar to be observed in the urine withdrawn an hour afterwards.

*Deligation of carotid and vertebral arteries ; production of saccharine urine.*

*Experiment.*—A healthy dog, fed at 11 a.m., and operated on three quarters of an hour later. Under the influence of chloroform, the two vertebrals and carotids were tied. Twenty-five minutes afterwards the urine was found intensely saccharine. In securing the vertebrals a great deal of the surrounding tissue had been taken up ; and, on the right side, the two nervous cords passing from the pneumogastric to the superior thoracic ganglion of the sympathetic were found on dissection to be included in the ligature. The ascending branches of the thoracic ganglion escaped untouched.

*Experiment.*—A strong-looking dog, the urine of which was withdrawn and tested before the experiment, and gave no reaction of sugar. Four hours after the accustomed meal of animal food the two vertebrals and carotids were tied. In the case of the vertebrals, from deficiency of light, a considerable disturbance of the surrounding tissue—a much greater disturbance than in any of my other operations—was effected before the vessels were picked up. In thirty-five minutes' time the urine was very strongly saccharine. On the following day the animal appeared but little disturbed by the operation, and ate a fairish quantity of the food that was given to it. The urine, however, had lost its saccharine quality. The animal was pithed, and an examination of the parts, operated on, made. Neither of the two larger ascending filaments belonging to the superior thoracic ganglion were divided, or included in the ligatures.

Having mentioned the results I have obtained as the effect of ligaturing the two vertebral and carotid arteries, I will now show what is produced by carrying the operation further, and dividing the contents of the vertebral canals in some part of their course.

*Careful deligation of vertebrals and carotids; division of the contents of the vertebral canal on each side; saccharine urine.*

*Experiment.*—A healthy dog, five hours and a half after food. The two vertebrals neatly isolated and tied; the two carotids also ligatured. An hour afterwards the urine withdrawn gave no trace of saccharine reaction. By means of a pair of bone nippers the transverse processes were divided so as entirely to cut through the contents of the vertebral canal, on one side opposite the third, on the other opposite the fourth, cervical vertebra. A considerable amount of hæmorrhage was at first occasioned, but it soon ceased, without any measure being adopted. The animal lay motionless and insensible. The eyelid moved on touching the conjunctiva, but there seemed a loss of the sense of vision. The third eyelid was stretched across, in front of the globe. The breathing was natural, and the heart's action was strong. In an hour's time urine had accumulated to a considerable extent in the bladder, and gave a strong reaction of sugar, a copious yellow reduction with the Barreswil solution. The dog died during the night, and the urine found in its bladder the next day was still intensely saccharine.

*Experiment.*—A healthy-looking dog. The two vertebrals carefully isolated and tied, and also the two carotids. In an hour and a half the urine was examined, and gave no trace of the presence of sugar. An operation was made for division of the contents of the vertebral canals opposite the fourth cervical vertebra (subsequent dissection showed that this was completely effected on the left side, but on the right side, although the canal was fully opened, yet all the contents were not completely divided); a large gush of blood took place, but the hæmorrhage was only of short duration. The animal now lay powerless on its side, and apparently unconscious. The breathing was natural. In half an hour's time a catheter was passed into the bladder, but there was not a drop of urine to be procured. The dog was placed aside, and found dead, stiff, and cold, the next morning. The bladder was then distended with urine, which gave an intensely saccharine reaction. Everything about the abdomen presented

a healthy appearance. There was no unnatural vascularity of either pleura.

*Experiment.*—A healthy dog, urine giving no reaction of sugar. The two vertebrae carefully tied, and then the two carotids; next, the contents of the vertebral canals completely divided opposite the second cervical vertebra. Whilst doing this the respiration suddenly ceased, and had to be sustained artificially; but soon the animal recovered, and resumed breathing of its own accord. There was scarcely any blood lost during the operation. In an hour's time the urine was withdrawn, and gave an intense reaction of sugar.

*Experiment.*—A good strong dog. The two vertebrae carefully tied, and then the two carotids, afterwards the anterior surface of the transverse process of the atlas exposed on each side, and the parts in the neighbourhood, of the vertebral foramen destroyed, both before and behind. Scarcely any blood was lost, and but very little disturbance indeed was created, the animal on recovering from the chloroform being quite conscious, and moving freely about. Some urine had been voided during the operation, and gave no reaction of sugar: that collected by catheterism fifty-five minutes afterwards yielded a most abundant saccharine indication. Two days later the dog was alive, and had taken food. The urine had lost its saccharine impregnation. Life being destroyed, an autopsy was made. All the organs in the chest and abdomen presented a healthy appearance. There was not the slightest sign of any pleurisy.

These experiments cannot be regarded as otherwise than furnishing evidence of a most positive character. In the first two, time was given to see if any effect resulted from ligaturing the vertebrae and carotids before the division of the contents of the vertebral canals was accomplished. In the latter two, this time, however, was not allowed; and although, therefore, the results are not quite so significant, yet they may be fairly accepted as giving weight to the others.

It is right to mention, that I have met with one experiment, where the operation I have been referring to, was not succeeded by diabetes; the reason of which I am totally unable to account for. The facts of the case were these. In a strong

and healthy-looking dog, a few hours after taking food, the two vertebrae were carefully picked up and tied, and also the two carotids. The contents of the vertebral canals were afterwards completely divided; on the right side, opposite the lower part of the second; and on the left, opposite the lower part of the third cervical vertebra. Some amount of blood was lost, but the hæmorrhage was not to an extent likely to act prejudicially. Whilst operating, however, on the right side my director passed into a spinal canal, between the second and third cervical vertebrae, and must have injured the spinal cord, as the breathing immediately stopped. The respiratory apparatus was instantly adapted, and the respiration kept up artificially. The heart continued beating well. The head appeared quite dead, and the eyelids did not respond to irritation of the conjunctiva; but the body seemed quite alive, the animal frequently moving its legs and wagging its tail from side to side as long as the artificial breathing was continued. An hour and a quarter after the operation on the vertebral canals was completed, the urine gave not the slightest trace of saccharine reaction. The liver, treated according to my method with potash, was found totally free from sugar at the moment of death, but became strongly saccharine afterwards.

Having noticed the effect produced by dividing the contents of the vertebral canals after ligaturing the vertebral and carotid arteries, and having by this time found also, that no apprehension of death need be entertained from loss of blood, if the experiment were performed without any deligation of arteries, I determined to operate only on the vertebral canals, and most unexpectedly discovered, that the inclusion of the carotids in the experiment was a necessary condition for the production of diabetes. I have now upon several occasions practised division of the contents of the vertebral canals, but have never yet observed it alone occasion saccharine urine. Here are the details of a couple of experiments on this point.

*Division of the contents of the vertebral canals ;  
no diabetes.*

*Experiment.*—A very strong and healthy-looking dog, fed  
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a few hours previous to being operated on. The vertebral canal on each side exposed and the contents completely divided opposite the fourth cervical vertebra. A large quantity of blood was lost, but the hæmorrhage was checked by a stream of cold water directed upon the bleeding parts. The animal laid upon its side after the operation, in rather a prostrate state. The urine, up to two hours and a half afterwards, gave no sign of saccharine reaction.

*Experiment.*—A lively and healthy-looking dog, fed at 11 a.m., and operated on at 3:30 p.m. The contents of the vertebral canal on each side completely torn through with a blunt hook-shaped instrument, as they escaped through the upper opening of the foramen in the transverse process of the second cervical vertebra. There was some amount of hæmorrhage, but none of any material extent, and the animal appeared very little disturbed by the operation. In a little more than an hour's time the urine was collected, and gave no reaction of sugar.

From these experiments only negative information is derived. The contents of the vertebral canals were divided, but the vertebrals and carotids were not tied, as previously, and there was no diabetic effect. To show, in a positive manner, the actual part played by the ligaturing of the vessels, I submitted a dog to the following operation.

*Deligation of the vertebrals and division of the contents of the vertebral canals ; no diabetes ; subsequent deligation of the carotids ; strong diabetes.*

*Experiment.*—A strong healthy-looking dog, about four hours after a meal of animal food. The two vertebral arteries carefully picked up and tied, and then the contents of the vertebral canals divided immediately after escaping from the foramen in the transverse process of the second cervical vertebra. Some amount of hæmorrhage was occasioned, but none of any material extent. In an hour's time the urine gave not the slightest trace of saccharine reaction. The two carotids were now isolated and tied, and an hour and a quarter after, the urine, removed by a catheter from the bladder, gave a strong

reaction of sugar—a complete yellow reduction of the Barreswil solution.

With this evidence before me, I next sought to discover what could be the influence of the ligature on the carotids in determining this effect. Was it by the simple obstruction of the streams of blood flowing through them to the head, or was it by the destruction of sympathetic filaments ramifying upon the exterior of the vessels? I cannot see how the effect could possibly be due to the former supposition; for, as I have shown, carefully ligaturing the vertebrales before they enter their canals and the carotids does not occasion diabetes, and, as I shall presently point out, I have never succeeded in producing saccharine urine by tying the carotids and dividing the contents of the vertebral canals completely at their upper terminations; that is, above the foramen, on the anterior surface of the transverse process of the atlas. As to the second supposition, the subjoined experiments will be found, I think, to stand in its support. And, looking to the information that is to be obtained from anatomy, there is at the upper part of the neck the largish oval-shaped ganglion of the sympathetic, which sends off one branch to the pneumogastric, and numerous filaments towards the carotid artery. We shall see presently the intensely diabetic effect that is occasioned by a removal of this ganglion; and there is nothing unreasonable in the idea, that the destruction of its carotid branches, conjoined with the destruction of the sympathetic in the vertebral canal, occasioned the result obtained in the last-described experiment. The destruction of either singly is not sufficient to produce the effect which the destruction of the two would seem to be the cause of inducing. Although I have said thus much about the carotid filaments of the sympathetic, yet, I must own, I scarcely know how to reconcile the result of the following experiment, unless the nerves should ramify actually in the coats of the vessel.

*Division of the contents of the vertebral canals and of the structures around the carotid vessels; no diabetes: subsequent deligation of the carotids; strongly-marked diabetes.*

*Experiment.*—A good-conditioned dog, taken about five hours

after it had been given its food. The contents of the vertebral canals divided at their escape from the foramen in the transverse process of the second cervical vertebra. A considerable amount of hæmorrhage was occasioned, but not enough in any way visibly to affect the animal. The carotid sheath was now picked up on each side; the nerve was cleared from the surrounding tissue and dropped; the artery was also cleared, and as much of its external coat as was justifiable scraped away, and then also dropped. What remained belonging to the sheath was afterwards divided. In an hour's time a catheter was passed into the bladder. Some pale-coloured urine flowed, which was not in the slightest degree saccharine. The two carotids were now tied. In an hour and a quarter the contents of the bladder were collected and found to be intensely saccharine, causing a complete orange-red reduction of the Barreswil solution.

In another experiment, of a similar description, that I find recorded amongst my memoranda, the contents of the vertebral canal escaped complete division on one side, and there was no saccharine urine. The dog was a healthy-looking little one, which, up to the time, had always eaten all the food given to it; but the day of the experiment had only taken a portion of its accustomed meal. The operation was made for the division of the contents of the vertebral canals immediately above the foramen in the transverse process of the second cervical vertebra; but it proved, on dissection after death, that on one side some tissue was left undivided in the groove forming the continuation of the foramen. The amount of blood lost was quite of an insignificant character. In an hour and a quarter the urine was not saccharine. The carotid sheath on each side was then picked up and the nerve and artery cleanly dissected out, and the rest of the tissue divided. Three quarters of an hour afterwards the urine was still not saccharine. The carotids were next tied, and three quarters of an hour still later the urine was again found totally devoid of sugar. The animal, being now killed and placed aside, the liver was tested on the following day, and gave a reaction of sugar, although not nearly so strong a one as usual. All the viscera presented a healthy appearance, and there was some food contained in the stomach.

In two experiments, I have tried the effect of dividing the carotid arteries and connecting their two extremities with a piece of silver tubing, so as to allow the circulation to be kept up. From the coagulation, however, which soon took place in the vessels, the object I had in view failed to be attained. Saccharine urine, but very much stronger in one case than the other, was the result in each instance. I will just mention the leading points of the experiments.

In the first, a silver tubing (about half an inch long and of as large a bore as the vessel would take) was introduced and ligatured into the two ends of the divided carotid artery. Both sides were treated alike, and the operation was accompanied with the division of the remainder belonging to the carotid sheath, with the exception of the pneumogastric nerve, which was left. The contents of the vertebral canals were then divided just above the foramen in the transverse process of the second cervical vertebra. The urine, before the operation, gave no reaction of sugar. In a little less than an hour after its completion, the urine was found in an intensely saccharine condition. On immediately looking at the arteries, each was discovered to be completely obstructed by a clot of blood.

In the second, the vertebral canals were first divided just above the foramen in the transverse process of the second cervical vertebra. The tubes were then placed in the carotid arteries, of which a complete section was made with all belonging to the carotid sheaths, excepting the pneumogastric nerves. The operation on the vessels occupied about a quarter of an hour's time on each side; and when the second side was finished the first was looked at, and the artery found still pervious, but half an hour later it was completely plugged with a clot of blood. The second side at this time, yet allowed a free circulation to take place; but half an hour still later, this vessel also was entirely plugged with a clot. The urine, an hour and a quarter after the operation, gave no indication of the presence of sugar; but three quarters of an hour after this, a fresh quantity withdrawn yielded a slight but unmistakable saccharine reaction.

In several of the experiments to which I have been referring, the contents of the vertebral canal have been attacked,



as high as the second cervical vertebra, and with the production of diabetes. Now, I take it to be the lesion of the sympathetic which constitutes the essential cause of this effect. The branches of the superior thoracic ganglion may be seen entering the canal below, and noticed joining with the lower cervical nerves; but they are very difficult to follow out far in their ascent through the neck, and I cannot say that I have been able by coarse dissection to trace them much above the middle. Physiologically, however, and from the anatomical connexions of the sympathetic in other parts of the vertebral region, I should infer they extended to the top of the neck. I have never yet produced saccharine urine, although I have not unfrequently tried, by a destruction of the parts issuing through the vertebral canal on to the anterior surface of the transverse process of the atlas; but I have already mentioned an experiment, where this, and the insertion of an instrument through the foramen, so as to destroy what might be in the vicinity of it behind, was attended with a most strongly-marked diabetes. In that experiment, however, the vertebrae, as well as the carotids, had been tied, and I could not, therefore, be quite sure that the saccharine urine did not arise from this part of the operation. In the following experiment only the carotids were tied, and the result was the same, although not so rapid nor so intense.

*Ligature of carotids; destruction of parts in front and behind the transverse processes of the atlas in the vicinity of the foramen; saccharine urine.*

*Experiment.*—A fat healthy-looking dog, two hours after taking food. The carotid sheath on each side was picked up, and all belonging to it, except the pneumogastrics, included in a couple of ligatures, between which a complete section was made with the scissors. The anterior and posterior surfaces of the transverse processes of the atlas were next scraped bare, so as to destroy all that laid in connexion with the vertebral foramen. There was no hæmorrhage of any material consideration. The urine before the operation gave no reaction. The urine an hour and a half afterwards, gave a strongish reaction, and half an hour still later, a decidedly strong reaction of the presence of sugar.

The vertebral canal, in ascending past the second cervical vertebra, reaches the foramen on the posterior aspect of the transverse process of the atlas ; running through this foramen it arrives on the anterior surface of the transverse process, where its contents may be seen coursing up to the interior of the skull. On the anterior surface, then, of the transverse process of the atlas, the contents of the vertebral canal may be easily reached, but, as I have before stated, a destruction of these contents here never, as far as my experience yet goes, produces diabetes ; notwithstanding, as I have shown, their destruction on the other side of the foramen is attended with that result. It would seem probable from this, that nervous filaments may run up on the posterior surface of the process to the sub-occipital nerve, for which I see no other likely means of connexion with the sympathetic ; but I must confess that I have not been able decidedly to display, by dissection, any distinctly recognisable nerve-twigs in this position. From the vertebral foramen, it is true, small vessels may be traced (sometimes in little grooves, to be seen on the bone) to the point of exit of the sub-occipital nerve from the spinal canal ; but, I say, with these vascular branches I am not enabled to state that I have seen decidedly any nervous filaments, although I fancied in one case that I had made out their presence.

The experiment that was last described furnishes conclusive evidence that saccharine urine is to be produced by destroying the contents of the vertebral canal as high up in the neck as the atlas. Nothing else was there effected, beyond that, and a division of all belonging to the carotid sheath except the pneumogastric nerve. It seems to me, however, that diabetes is not so readily occasioned by operating here as lower down ; and that when occasioned, it is not so rapid in its appearance, nor is it of such a degree of intensity. This makes me think that the result of the experiment mentioned in a former part of this communication, where the urine was intensely saccharine thirty-five minutes afterwards, was not due simply to the effects of this operation. The vertebral vessels were also tied below, and this certainly takes away from the specific character of that experiment.

I have rarely failed in meeting with saccharine urine after

dividing the contents of the vertebral canals opposite and below the second cervical segment, and ligaturing the carotids; but in operating opposite the atlas the following experiments I find recorded, would tend to show that the same result does not so readily follow. Here, especially, it seems necessary that the animal should be in excellent health and at a period of full digestion; but even with these conditions the operation has not always, in my hands, led to a decidedly marked presence of sugar in the urine, as is proved by the first of the three experiments to be described.

*Division of the contents of the vertebral canals opposite the atlas, and ligature or division of the two carotid arteries.*

*Experiment.*—An exceedingly healthy-looking dog, fed at 11 a.m., and operated on at 3.30 p.m. The carotid arteries picked up and divided after being ligatured twice. Next, the anterior surface of the transverse process of the atlas cleared from the tissue attached to it, and the parts destroyed escaping through the vertebral foramen, on each side of the neck. There was a remarkably trivial amount of hæmorrhage. Up to an hour and a quarter, the urine gave not the slightest trace of indication of the presence of sugar. Everything in connexion with the posterior surface of the transverse processes of the atlas in the neighbourhood of the foramen was now torn through. The urine, an hour and a quarter after this, still gave no decided reaction, although I fancied, from the behaviour of the test, that there existed a slight trace of sugar.

*Experiment.*—A dog presenting a rather emaciated appearance, but otherwise looking healthy. It had not been in the habit of taking its food so readily as most dogs, yet it nevertheless consumed what was given to it, during the course of the twenty-four hours. Three hours after eating some of its meal, one of the carotid sheaths was picked up, and the nerve having been dropped, the remainder was included between two ligatures and divided. The same was effected on the other side of the neck. The structures were then divided, passing through the foramen on to the anterior surface of each transverse process of the atlas. A considerable amount of blood was lost on

both sides, and the hæmorrhage had to be checked by the use of a stream of cold water. At the end of two hours, the urine yielded not the slightest sign of a saccharine reaction. The posterior surface of each transverse process of the atlas was now operated on, and the bone in the vicinity of the foramen made bare. One hour afterwards, there was still no sign of the presence of sugar in the urine; but a little more than an hour later, I obtained a behaviour of the Barreswil solution which afforded, I thought, evidence of a saccharine impregnation to a minute extent.

*Experiment.*—An exceedingly emaciated dog, but in other respects presenting a healthy appearance, and devouring voraciously the food that was given to it. Three hours after its accustomed meal, all belonging to the carotid sheath on each side, except the pneumogastric, ligatured in two places and divided. The parts in the neighbourhood of the vertebral foramen, in front and behind, belonging to each transverse process of the atlas, were lacerated and completely torn from their connexions. In an hour and a quarter's time, the urine was free from saccharine impregnation. A further operation was performed. The contents of the vertebral canals were divided just above the foramen in each transverse process of the second cervical vertebra. A little more than an hour after this second operation some urine was procured; and, although giving no decided reaction, yet contained, I thought, from the behaviour of the test, the merest trace of sugar.

In speaking of the anatomical connexions of the sympathetic, I have had occasion incidentally to allude to the superior cervical ganglion. And it is to the effect of the removal of this body that I will now specially refer. The ganglion, after a little experience, may be very easily reached in the living animal, and no structure of any importance need be disturbed by the operation. It lies in very close contact with the pneumogastric, but is to be separated, with a little care, without at all injuring that nerve. I always tear instead of cut, when I arrive in its neighbourhood, and with this precaution I scarcely ever occasion the slightest hæmorrhage. Of all the operations I am acquainted with, the removal of this ganglion is the most certain and speedy in producing diabetes in the dog. In the first experiments I con-

ducted on this point, I divided the pneumogastric nerves at the same time that I removed the ganglia; but since I found that the nerves had nothing to do with the production of the effect, I have left them uninterfered with, and thereby avoid that great disturbance which is the inevitable consequence of lesion of the pneumogastriacs. I will just mention the results of these first experiments, and afterwards give in detail the account of an experiment on the ganglia alone. In one instance, then, after the vertebral and carotid arteries had been ligatured one day, and the urine on the following day was quite free from sugar, and, after the animal, a few hours previously, had eaten pretty freely of food, a division of the pneumogastriacs close to the base of the skull, with a removal of the superior cervical ganglia was accomplished. From the effect of this operation on the muscles of the larynx, tracheotomy had to be performed to relieve threatened suffocation. In half an hour's time, the urine was strongly saccharine. In another instance, the vertebral and carotid arteries were tied, and there being no sugar in the urine an hour afterwards, the pneumogastriacs were divided close to the base of the skull, and the neighbouring ganglion on each side of the neck, removed. In forty minutes' time some urine was withdrawn and found to be intensely saccharine. In a third, the vessels were left untouched. The pneumogastric was divided only on one side, and that about the middle of the neck. The two ganglia were dissected out and removed. Half an hour after the completion of the operation, some urine was withdrawn, and presented the strongest reaction with the Barreswil solution; that voided just previous to the operation being perfectly destitute of sugar. The animal was allowed to live till the following day, when it was killed by pithing. It looked exceedingly heavy and congested about the eyes, which also had a watery appearance. It had frequently retched very violently, bringing up a mucous fluid from the stomach. Its respiration had also been slow, but not so as to excite distress. The dog, however, had been occasionally much troubled with a dry, short, convulsive cough. Food and drink were both refused. After death the bladder was found enormously distended. The urine gave a slight indication of the presence of sugar.

*Removal of the carotid ganglion of the sympathetic, first on one side, afterwards on the other ; saccharine urine in each case.*

*Experiment.*—February 16th, 1859.—A good-conditioned dog was fed at 8.30 a.m. At 11.30 a.m., under the influence of chloroform, the ganglion lying in contiguity with the pneumogastric at the upper part of the right side of the neck was torn away from its connexions and altogether excised. In an hour's time the urine was collected, and gave an intense reaction of sugar. The animal manifested very little disturbance, and appeared as lively as if no operation had been performed. The ear on the operated side was 3° (Fahr.) warmer than the other, the pupil was more contracted, and the nostrils were drier. At 5 p.m. the urine gave as strong a reaction as before.

February 17th.—The animal ate its food well, and was lively. At 5 p.m. some urine was withdrawn, and gave a pretty copious precipitate of sub-oxide of copper on boiling with the Barreswil solution.

18th.—Urine no longer saccharine.

19th.—Urine not saccharine. To the hand there was no appreciable difference of temperature between the two ears, and the two nostrils seemed equally moist, but the pupil was more contracted, and the third eyelid was raised across the globe on the operated side, as before. The other ganglion was now removed, and in half an hour's time the urine was strongly saccharine.

20th and 21st.—No observation made.

22d.—The urine gave no trace of saccharine reaction. The animal continued in good condition.

25th.—The urine free from sugar. Food was taken well, but the dog had become exceedingly surly, and its nostrils were both dry and covered externally with a collection, as is the case in distemper. Its life was now destroyed, and all the organs presented a healthy appearance.

Nothing can be desired to be more conclusive than the above experiment. To see the influence a badly nourished condition would exert on the result, I one day operated on

a dog in which a gastric fistula had been some time previously made, and which, owing to a displacement of the canula, had been recently badly nourished, from the escape taking place from the stomach. The animal looked exceedingly emaciated. At a period of digestion the ganglion on one side was removed. Up to an hour and a half's time, the urine remained free from sugar. The other ganglion was now excised, and an hour afterwards the urine, although not giving a neat reaction, yet behaved with the Barreswil solution so as to indicate, I thought, the presence of some amount of sugar.

Knowing that this ganglion gave off branches below to the pneumogastric and the carotid sheath, I was desirous of ascertaining the effect of destroying these connexions, and thus experimented on a dog for the purpose. The ganglion on each side was exposed, and all its descending branches torn through. The operation occupied a considerable time in being effected, and, about seven or ten minutes after its completion, the urine happened to be removed from the bladder, and on being tested gave the strongest reaction of sugar. Half an hour later, and again, half an hour after that, a catheter was introduced and the urine collected. The two specimens behaved alike, and gave, if any, the merest trace of reaction. The two ganglia were now picked up and excised, and in half an hour's time the urine had become intensely saccharine.

With regard to the interpretation of the results in this experiment, I cannot help thinking that the saccharine urine in the first instance was due to the effects of the manipulation on the ganglion in isolating it, to divide its descending branches. If it had been the division of these branches that occasioned the diabetic state, it would not, I consider, have been of so temporary a character, for as soon, or nearly as soon, as the operation was completed, the urine that was secreted resumed, if not entirely, almost entirely, an ex-saccharine quality, till the excision of the ganglia was effected. In another experiment, I left these bodies undisturbed, and raising the carotid sheath on each side, placed a couple of ligatures around the whole of it, which I afterwards divided about the middle of the neck. The pneumogastrics being included, the frequency of the respiration was much diminished, but there was not very much distress occasioned. In two and a quarter hours' time, the

urine gave but the merest trace of indication of the presence of sugar—a condition that I have good reason to consider due simply to the mechanical effects of the congestion occasioned by the division of the pneumogastrics.

Upon the sympathetic in the chest I have now operated several times. In a few instances, my operation has been attended with a fatal result before completion, from the entrance of air into the cavity of the chest, asphyxiating, by preventing the expansion of the lung. The position of the sympathetic trunk being known, it is easily picked up and divided. I used formerly, while the animal was under the influence of chloroform, to make an incision between a couple of the ribs, against the back, and by means of an instrument acting with a screw, forcibly to separate them, so as to be able to look into the chest; and on holding the lung away, to see the sympathetic before effecting its division. It frequently happened, however, that the operation thus performed was rendered exceedingly tedious by a difficulty in getting a sufficient amount of light thrown into the chest exactly where I required it. In my experiments now, I simply employ the sense of touch. Introducing the index finger through an incision, into the posterior part of the chest, and feeling for the heads of the ribs, I slide a curved director along beneath the pleura and nerve, and, raising it, hook hold of the latter with the finger, and tear it from its attachments to the extent I desire. The chest being forcibly compressed expels the air which has entered the pleuritic cavity; and the skin being instantly pinched up, the edges of the wound are sewn together so as to close completely the aperture that has been made.

In some of these experiments, I have noticed the strongest diabetes, whilst in others, from some cause I do not yet clearly see the reason of, there have been only traces of sugar to be discovered in the urine; and, even in others, no sugar at all. In two experiments I have divided the spinal cord as well as the thoracic sympathetic, and these I will first give an account of. In the one the urine became strongly saccharine, but in the other only moderately so.



*Division of the spinal cord and of the thoracic sympathetic.*

*Experiment.*—A strong and healthy dog, fed at 11 a.m. and operated on at 3.45 p.m. Under the influence of chloroform the spinal cord was divided between the fourth and fifth cervical vertebræ. The apparatus for artificial respiration was adapted, and artificial respiration kept up. An opening was then made into the chest on one side, between the eighth and ninth ribs, which were forcibly separated from each other, and the sympathetic trunk lifted up and torn through. The air being pressed out from the pleuritic cavity, and the wound being closed, the same operation was performed in a corresponding situation on the other side. From the division of the spinal cord the lower part of the body was completely palsied, but when the effects of the chloroform had gone off, the animal's head was alive, and conscious. I discovered also at the end of the experiment, that the animal was able to breathe without assistance. The third eyelid was drawn across the globe, and looked exceedingly injected. The pupils were neither particularly contracted or dilated. The urine before the experiment gave no reaction of sugar. The urine, one hour after the operation on the sympathetic was completed, gave an orange-red reduction with the Barreswil solution.

*Experiment.*—A dog in good condition, and of healthy appearance. The sympathetic trunk torn through on the left side, between the eighth and ninth ribs, and on the right side between the ninth and tenth ribs. The spinal cord next divided at the lower part of the cervical region. The urine voided, during the administration of chloroform before the operation, gave no reaction of sugar. The urine collected about ten minutes after the division of the spinal cord, and about forty minutes after the operation on the sympathetic had been completed, gave a moderate but decided indication of the presence of sugar. The urine collected half an hour later, behaved with the Barreswil solution in a similar manner.

In the latter experiment, sugar in the urine being encountered so shortly after the division of the spinal cord, tended to

show that this had nothing to do with its production ; and, from the following experiments, it seems, that diabetes may be produced by operating on the thoracic sympathetic alone, or even, on the thoracic sympathetic on one side only.

*Division of the thoracic sympathetic on each side ; diabetes.*

*Experiment.*—A healthy dog, about four hours after the ingestion of food. The sympathetic trunk torn from its attachments along a space of about two inches, and divided between the tenth and eleventh ribs on each side. It was the left side that was first operated on ; and, on account of the difficulty in getting sufficient light thrown into the chest, to see the nerve, some little time was occupied before its division was effected. On the other side, it was felt for with the finger, and somewhat easily divided without the aid of sight. About five to ten minutes after the whole operation was completed, some urine was withdrawn, and (to my astonishment) was found intensely saccharine. An hour later, the life of the animal was destroyed. The bladder contained a considerable quantity of urine, which gave a similar reaction to the other, an orange-red reduction with the Barreswil solution.

As in this experiment the urine was found intensely saccharine, certainly within ten minutes after the completion of the operation on both sides, it seemed to me that there was scarcely time for the second side—the operation on which was comparatively rapidly performed—to have been necessarily concerned in producing the effect. On the same afternoon I therefore performed another experiment, operating only on one side. The result was equally striking, as will be noticed from the following account.

*Division of the thoracic sympathetic on the right side only ; diabetes.*

*Experiment.*—A small but healthy-looking dog, taken about five hours after having been fed. Before the experiment, some urine was withdrawn, and found on testing completely devoid of sugar. Under the influence of chloroform, the chest was

opened on the right side towards the lower part, to a sufficient extent to admit the index finger. The sympathetic trunk was felt for, torn through, and detached, opposite about the sixth to the tenth ribs. The wound was closed, without having created any sensible disturbance of the respiration or circulation. In half an hour's time a catheter was introduced, and the urine collected gave an intensely saccharine reaction. Half an hour still later the animal was killed. The bladder contained scarcely any urine, but what there was, behaved precisely like the other.

Although nothing could be possibly more satisfactory than the results in the above experiments; yet, as I have before stated, from some reason I do not clearly understand, my operations on the thoracic sympathetic have not been always attended with a similar issue; and, as I desire that the matter, just as it stands before me should be exposed to others, I will give a concise account of the experiments I have conducted where there have only been traces of sugar in the urine, and the others in which there has been none at all.

*Division of the thoracic sympathetic; traces of sugar only in the urine.*

*Experiment.*—A strong, healthy-looking dog. Fed at 11 a.m., and operated on at 3 p.m. The sympathetic cord in the chest divided, on the right side between the eighth and ninth ribs, and on the left side between the sixth and seventh. In two hours and a half's time some urine was withdrawn, and tested with the Barreswil solution. It gave the merest trace of saccharine indication.

*Experiment.*—A dog presenting an appearance of good condition, but which had not been in the habit of devouring so freely its food, as is usual. It always consumed what was given to it during the course of the twenty-four hours, but only by small portions at a time. It had been fed at 11, but had not eaten much by 3 in the afternoon, when it was placed under the influence of chloroform, and an opening made into the left side of the chest, for the introduction of the finger, and the tearing through of the sympathetic. (Dissection after

death showed, that opposite the sixth and seventh ribs, the sympathetic had been detached from its connexions for a space of about an inch and a half, but had escaped division.) The wound being securely closed nothing more was at present done. The urine, up to an hour and three quarters afterwards, gave not the slightest saccharine reaction. The right side was now operated on, and the sympathetic divided opposite the head of the sixth rib. In thirty-five minutes' time the urine appeared to give a minute trace of reaction. An hour still later, the life of the animal was destroyed, and the urine contained in the bladder gave a traceable indication of sugar.

*Experiment.*—A dog in good condition, and always feeding well. Three quarters of an hour after its meal, the sympathetic was torn through, and detached on each side from opposite the eighth rib down to close upon the diaphragm. Urine, twenty minutes afterwards, gave no reaction; an hour and a quarter afterwards, it gave a slight but decided reaction; and four hours afterwards, when the animal was killed, it behaved the same.

*Experiment.*—A rather spare but otherwise healthy-looking dog. Fed at 10:30 a.m., and operated on at 3:15 p.m. The sympathetic torn through, and separated from its attachments opposite the ninth to the eleventh ribs on the right side, and the seventh to the tenth ribs on the left side. All the urine that could be obtained was drawn off from the bladder. In an hour's time a little more was procured, and this, on boiling with the Barreswil solution, gave a slight but decided reaction, indicative of the presence of sugar.

*Experiment.*—A large, very healthy-looking, and good-conditioned dog. Fed at 11 a.m., and operated on at 2:30 p.m. The sympathetic trunk torn through and detached, on the left side opposite the eleventh and twelfth, and on the right side opposite the tenth and eleventh ribs. The urine, in three quarters of an hour's time, gave no sensible trace of saccharine reaction. An hour and a quarter later, the life of the animal was destroyed. The bladder contained from three to four ounces of urine, notwithstanding a catheter had been intro-

duced before the operation, and a very large quantity (the whole contents of the bladder I had imagined) had been withdrawn. On testing this urine it gave the minutest indication of the presence of sugar.

*Division of the thoracic sympathetic; absence of sugar in the urine.*

*Experiment.*—A healthy dog, taken four hours and a half after having been fed. By means of the finger introduced into the chest through the sixth intercostal space, the sympathetic on the left side was divided and detached, opposite the fifth, sixth, and seventh ribs. The urine, an hour afterwards, gave no reaction of sugar. The right side was now operated on, and the sympathetic divided and torn from its attachments opposite the seventh and eighth intercostal spaces. Some amount of hæmorrhage was occasioned, about a couple of ounces of blood being found in this side of the chest after death. In two hours and a quarter the animal was killed. The urine contained in the bladder gave not the slightest sign of saccharine impregnation.

*Experiment.*—A strong, healthy-looking dog. Fed at 11:30 a.m., and operated on at 3:45 p.m. The sympathetic on the left side torn away, from the seventh rib, and on the right side the ninth rib, downwards to the diaphragm. In an hour and a quarter's time the life of the animal was destroyed. The contents of the bladder gave no decided indication of the presence of sugar.

To ascertain the effect of dividing the nerves immediately connected with the liver—those contained in the lesser omentum—I have made two experiments. The operation is necessarily a most severe one. Chloroform being administered, an incision into the abdomen was made, and all brought forward with the finger belonging to the lesser omentum. The portal vein, hepatic artery, and hepatic duct, were then dissected out, and the whole of the remaining tissue surrounded by two ligatures, and divided between them. In both of the experiments a considerable amount of hæmorrhage resulted—in one from a

branch of the portal vein having been injured in isolating that vessel, and in the other from one of the ligatures having slightly slipped, so as to allow an artery to bleed. In the former the loss of blood ceased of its own accord, in the latter it was controlled by the application of another ligature. Neither experiment was attended with the slightest discoverable diabetic effect.

All that I have hitherto had to say in this communication has been derived from experiments conducted upon the dog. I have also conducted some experiments upon the rabbit, but, as far as my experience has yet gone, although diabetes can be produced by operating on the sympathetic of this animal, yet it is not with such readiness as in the case of the dog. In some few instances I have tried to attack the sympathetic at the lower part of the neck, but the rabbit is a much more delicate animal for experimenting on than the dog, and the nerves, being smaller, are much more difficult to see. Some of my animals have died during the operation, and in those which have survived, I have not yet encountered the production of diabetes. With regard, however, to the sympathetic in the upper part of the neck, I am enabled to speak in much more satisfactory and positive terms. The superior cervical ganglia are conspicuous bodies, and with the greatest facility reached and removed, without the disturbance or destruction of any important structure. Their removal in the healthy and vigorous animal occasions saccharine urine, although the effect is not produced with anything like the rapidity that it is in the dog. I will give the particulars of an experiment in proof of the assertion that has been made.

*Removal of the superior cervical ganglia in the rabbit ;  
diabetes.*

*Experiment.*—A large and very healthy-looking rabbit, to which food had been given a short time before the experiment. Some urine was collected from the bladder. It was exceedingly turbid (as it always is in the rabbit during active digestion), and perfectly destitute of sugar. The superior cervical ganglion was exposed and removed, on each side of the neck. As a branch of the carotid artery happened to be wounded close

to the main trunk, a ligature was placed around the vessel on that side, about the middle of the neck. There was no sensible disturbance produced, the animal appearing as lively as if nothing had been done. In an hour and three quarters' time some urine was withdrawn. It was turbid, although not quite so much so as before, and did not yield any decided indication of the presence of sugar. Four hours and a half after the operation, some urine was again collected, and now gave a very strong reaction with the Barreswil solution. The pupils at this time were alike, and moderately contracted. The conjunctivæ were very much injected, and the eyes suffused with lachrymal secretion. On the following day the animal ate as usual, and seemed quite well. The urine still gave an indication of being charged with sugar, although not to such an extent as at the last examination. The animal was now submitted to an experiment on the pneumogastrics, and all evidence of sugar soon disappeared from the urine.

My other experiments are confirmatory of removal of the superior cervical ganglion being unattended with that immediate production of saccharine urine in the rabbit as is the case in the dog, and I at first thought that the operation was unaccompanied with the production of diabetes at all. I have noticed, however, where the ganglia have been excised, and the pneumogastrics at the same time divided on their emergence through the base of the skull, that in an hour's time the urine has become strongly charged with sugar. Thus, in a good-conditioned, nearly full-grown rabbit, at a period of full digestion, the superior cervical ganglia were removed, and the two pneumogastrics divided just above the pinkish gangliform enlargements on them, immediately below the base of the skull. The respiration was rendered somewhat laborious, and sometimes attended with a croupy noise. The saliva ran from the animal's mouth. In a little more than an hour after the operation the urine gave a strong reaction of sugar with the Barreswil solution.

Notwithstanding this result, I have not found that division of the pneumogastrics alone, practised above their gangliform enlargements, produces diabetes; nor have I found, after the pneumogastrics have been divided a little time, that the

removal of the sympathetic ganglia determines any positive effect. For example, in an excellent-conditioned, rather better than half-grown rabbit, the two pneumogastrics were divided above their gangliform enlargements at the top of the neck. In an hour and a half there was no indication of the presence of sugar in the urine. The animal died during the night. The liver was strongly saccharine when examined according to the ordinary method after death, but the urine contained in the bladder, yielded no sign of saccharine reaction. In another half-grown rabbit, presenting a fair-conditioned appearance, the two pneumogastrics were divided close to their exit from the skull. In one hour's time there was no sugar in the urine. The frequency of the respiration had been diminished, but the animal did not appear in any distress, and moved about in a lively manner. The two superior cervical ganglia were now excised, and immediately the creature crouched itself up into a heap, with its coat standing out, and, altogether, giving the aspect of being in a most sickly state. The breathing was also performed with difficulty, and accompanied with a kind of croupy noise. Nearly an hour after the second operation the rabbit suddenly started from its position, was violently convulsed, and suddenly died. The urine contained in the bladder gave no indication of being charged with sugar. In a third experiment a full-grown and very healthy-looking rabbit was taken, after having been fed about an hour and a half. The two pneumogastrics were divided close to the skull, and above the pinkish gangliform enlargements on them. So little disturbance was created that it was scarcely apparent, from the aspect of the animal, that any operation at all had been performed on it. Up to four hours' time there was not the slightest evidence of the presence of sugar in the urine, which was exceedingly viscid and opaque. The superior cervical ganglia were now removed, and the animal was thrown into the same state as the preceding one, except that the respiration was comparatively pretty easy. The third eyelids were drawn across the globes. In an hour's time the urine had become transparent. Now, and two hours later, it did not contain the slightest trace of sugar.

From this series of experiments we have conclusive evidence before us, that lesions of certain parts of the sympathetic system



produce a most strongly-marked diabetes—a diabetes, however, as far as I have yet discovered, which is only of a temporary character. What the chain of phenomena is that determines such an effect, constitutes the important problem that yet presents itself for solution. My attention is still being specially directed to this question, and I hope ere long to have something definite to place in the hands of the profession. I cannot help being strongly impressed with the conviction that a full investigation of this subject may lead to a considerable advancement of our physiological knowledge. It seems to me most intimately mixed up with the deeper strata of vital chemistry—those, at present, obscure chemical phenomena presided over by LIFE, and known under the expressions of secretion, nutrition, and assimilation. I cannot help thinking, also, that a fair prospect is in view for materially extending the exceedingly scanty knowledge we possess concerning the functional agency of the sympathetic.

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## DESCRIPTION OF PLATE,

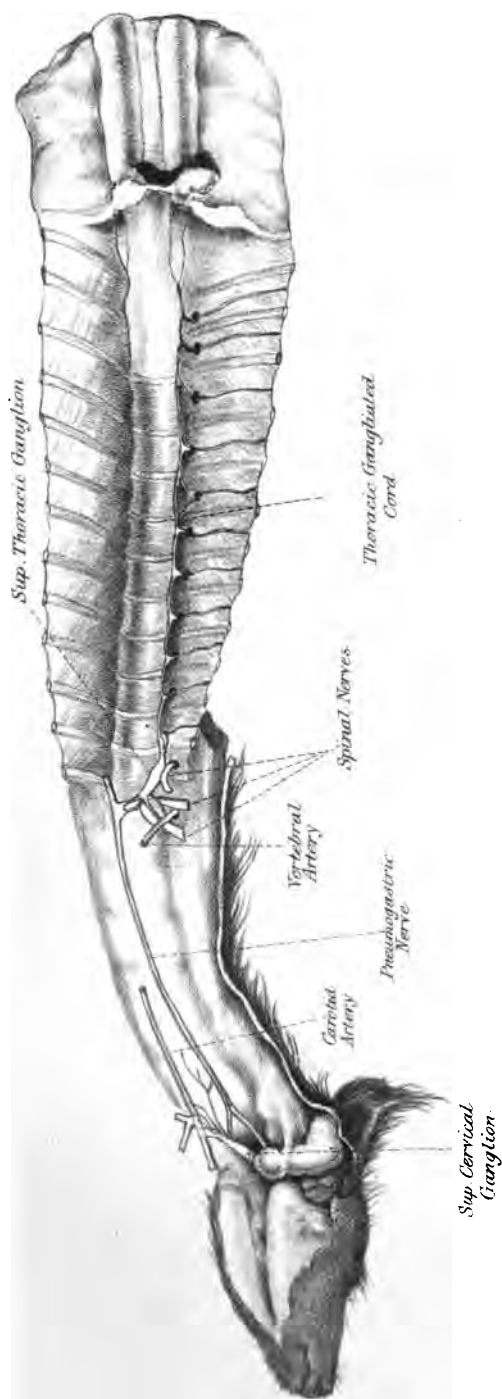
### *Showing the Cervical and Thoracic Sympathetic of the Dog.*

From the superior cervical ganglion a large nervous cord may be seen passing down to join the pneumogastric. Other branches run towards and ramify along the carotid artery and its divisions, and other filaments also are shown going towards the pharynx.

On following the pneumogastric down towards the chest, it presents an enlargement, and at this point there are two good-sized nerves derived from it, which connect it with the superior thoracic ganglion of the sympathetic.

The superior thoracic ganglion, besides being connected as above with the pneumogastric, sends a couple of nerves up towards the vertebral canal. A third branch is also shown in the drawing. It is very minute, and takes the same direction as the others, but lies in closer proximity to the vertebral vessel.

The ganglion gives off below, branches to join the upper dorsal nerves, and is connected by another branch with the remainder of the chain of ganglia constituting the thoracic sympathetic.



Day & Son, Lith'rs, to The Queen.

W. H. & S. 4.



# CONTRIBUTIONS TO THE PRACTICAL SURGERY

OF

## NEW GROWTHS OR TUMOURS.

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### SERIES III.—CYSTS.

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By JOHN BIRKETT.

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IN this communication I propose to illustrate those new growths, dependent upon the formation of cysts, which are developed in the tegumentary tissues of the different regions of the body. It will include, not only those of the whole external surface of the body, but also so much of the mucous membranes as are within sight of the oral orifice and the female genital organs.

#### I. THE CYSTS OF THE CUTANEOUS COVERING.

Sir Astley Cooper has published a very interesting paper on "Encysted Tumours," in the second part of 'Surgical Essays,' to which I refer the reader.<sup>1</sup> He there demonstrates the relation which these formations have with a morbid condition of the sebaceous glands. I propose to commence with the simplest form of the disease, and to illustrate the most complicated.

<sup>1</sup> 'Surgical Essays,' by Astley Cooper and Benjamin Travers, Part II, Essay III, 8vo, London, 1819.

## I. CYSTS IN RELATION WITH THE GLANDS WHICH SECRETE SEBACEOUS MATTER.

Syn.—*Encysted Tumours, Cutaneous, Subcutaneous; Sebaceous Cysts; Steatoma; Meliceris; Atheroma.*

With the exception of the cysts developed around foreign bodies and entozoa, all of those which are developed in the skin depend upon a morbid process taking place in glandular structures. In the observation of a new growth dependent upon the development of a cyst or closed cavity, two parts are to be examined: first, the cyst wall; secondly, the contents of the cyst.

“The sebaceous glands are small whitish glands which exist in almost every part of the skin, and which afford the cutaneous sebaceous or fatty secretion.

“In form they vary very considerably; the simplest are short follicles of an elongated or pyriform shape.”<sup>1</sup>

The woodcuts in Kölliker's book demonstrate the minute anatomy of these organs. Every gland consists of the *membrana propria* which is interposed between the fibrous envelope of the organ and the epithelium covering its external surface. This envelope, composed of connective tissue, attaches it to the surrounding parts, and in it the capillary blood-vessels of the gland ramify. In the cavity of the sacculus the secretion collects, and it escapes at the excretory duct.

Under the common term of wen, tumour, or excrescence, we meet with various morbid conditions of these secreting organs; but in all of them, unless some destructive action has taken place, the anatomical elements of the gland may be traced.

The simplest form is that in which a small nodule can be felt beneath the integument under which it rolls, if there be much loose connective in the region where it is found; as, for example, in the axillæ or neck. With a little careful examination of the skin covering the surface of the lump, at or near

<sup>1</sup> Kölliker, ‘Manual of Human Histology,’ the translation published by the Sydenham Society, vol. i, pp. 220, 224, figs. 84, 85, 86, 87.

its centre, there may sometimes be seen a slight depression, which is rendered deeper if the surrounding integuments are nipped up between the finger and thumb. By this central depression the subcutaneous nodule seems to be attached to the skin, but in no other part. This depression indicates the site of the original orifice of the duct of the morbid sebaceous gland which now forms the nodule under observation. Pressure on the sides of the lump will, in some instances, cause the contents of the sacculus to escape at this point, and a probe may often be introduced thereat. The offensive odour of the secretion, so long retained, will not fail to attract attention. Sometimes, after a sebaceous tumour has existed several years, this once-obstructed duct will reopen spontaneously, and then the patient empties the sacculus without difficulty. But the emptying of the cyst does not effect the removal of the annoyance, for whilst it remains the secretion continues. Let us then now examine *the cyst*. This consists of fibre or connective tissue, and the blood-vessels ramifying in it, of the *membrana propria* and epithelium. To examine one of these cysts carefully, after its removal from the body, the epithelial surface should be everted, floated in water, and the sac stuffed with hair, then several layers of epithelium scraped off until the *tunica propria* is reached. When floating in water the fibrous envelope shows the loose connective tissue by which it was united with the surrounding parts, and the minute blood-vessels distributed to it. Thus, in one of these sebaceous tumours we can trace all the elementary structures of a normal sebaceous gland. The morbid action which has taken place would seem to depend chiefly on the obstruction of the excretory duct, in consequence of which the sebaceous secretion collects and dilates the simple sacculus by mere accumulation. All the changes taking place in the other tissues of the gland appear to be simply an increase in the amount and strength of their textural elements. Thus, the epithelium is more abundant, the *membrana propria* less delicate, and the fibrous envelope more dense.

This variety of the sebaceous tumours is most frequently found in those regions of the body in which the simplest form of sebaceous gland is developed, or where these peculiar glands exist in the greatest abundance. Therefore, in the axillæ, by

the side of the neck, on the back, and in the bosom, they are often brought under our observation.

Their diagnostication is easy. The superficial situation which they occupy enables the surgeon to distinguish them from the new growths of the surface of the body, such as fatty and fibrous developments, which are generally more deeply seated. The plastic nature of their contents permits an alteration in their usual configuration, which is maintained for a variable length of time, according to the fulness of the sac. This characteristic belongs to no other morbid growth, but is peculiar to this variety only.

To eradicate the cyst is the object of the surgeon. Unless it be wholly removed the secretion continues, and a constant source of annoyance arises. Excision is preferable to all other modes of treatment. It more speedily accomplishes the desired end than any other proceeding, and is more certainly attended with success. If the patient will not submit to the employment of the knife, means must be adopted to inflame the cyst. Suppuration then takes place, and it can be pulled out. Nitric acid applied over the cutaneous surface will effect this object, and, if the sac is opened, a small bit of potassa fusa, or a drop or two of nitric acid introduced therein, will induce suppuration and the destruction of the cyst.

I have never yet seen any bad result follow the removal of these sebaceous tumours.

The simplest form of the growth with which we meet in practice is that which produces a small, round, or oval elevation of the superjacent integuments, is slightly adherent to them, and requires removal on account of the unsightly appearance produced when on the exposed surfaces of the body.

*CASE I.—Cyst, with sebaceous contents, in the cheek.*

G. H.—, æt. 17, a healthy man, but of strumous diathesis, had observed for two years a small tumour in the left cheek. It slowly increased in size, was never painful, but, lately, produced an unsightly elevation of the integuments. The nature of the growth being diagnosticated, the integuments over the cyst were divided, and it was removed without difficulty. The cyst was fibrous, lined with epidermis-scales, and the contents

consisted of sebaceous secretion and epidermis. The wound healed quickly.

CASE II.—*Sebaceous cyst on the back.*

M. A. S—, æt. 32, came into Guy's with a tumour on the central line of the back, over the spinous processes of the middle dorsal vertebræ. It had been growing ten years, and being now about three inches in diameter, it was inconvenient. The cyst and its contents were excised, and the wound healed favorably. The first was fibrous and strong; the contents, soft and greasy, emitted the offensive odour peculiar to these accumulations of sebaceous matter.

CASE III.—*Sebaceous cyst in neck; excision; cure.*

A man, æt. 32, came into Guy's in 1854, with a tumour on the right side of the neck, immediately below the horizontal ramus of the lower jaw, where it had been growing several years. It formed an unsightly projection, and he was desirous to have it removed. By making a careful examination of the surface at about its centre, a minute depression was noticed, and this was made more distinct by compressing the lump laterally. The skin at this point was in close connexion with the cyst. The cutaneous surface was everywhere else quite smooth and healthy. An incision was made in the skin to the surface of the cyst, which was detached very easily from its surrounding connexions. It contained sebaceous matter, and was lined by epidermis-scales. The wound soon healed.

CASE IV.—*Sebaceous cyst over scapula; its plasticity.*  
(Drawing 159<sup>80</sup>. Prep. 1643<sup>55</sup>.)

A man, æt. 57, came under my observation in the hospital with a sebaceous cyst developed over the right scapula. It had been there several years, and now began to be troublesome from its size and position. The blood-vessels of the integuments were large and rather varicose. The diameters were about an inch and three quarters by two inches and a quarter, and it projected about an inch and a half in relief. The contents



were soft, and the cyst was not tense. The plasticity of the tumour was very remarkable. By pressing the sides they could be flattened, and they retained the lateral depressions made by the finger and thumb for some time. The drawing in the museum shows these points very well. There is no other growth in the body which would admit of this alteration in shape. If the cyst had contained fluid, its equal pressure in all directions would have induced the immediate return of the tumour to its original figure after the removal of the compressing force. If the growth had been fat, its outline could not have been thus influenced by pressure. If it had been vascular, its size might have been reduced by pressure, but it would have quickly resumed its usual dimensions. The contents of the cyst being, however, soft, and easily moulded by pressure, the shape of the mass was immediately changed, and as they possessed little resiliency, they maintained the form given to them.

CASE V.—*Sebaceous tumour over and by the side of the os coccygis ; excision ; cure.* (Prep. 1654<sup>65</sup>.)

A woman, æt. 25, came into Guy's Hospital in 1857, with a tumour in the coccygeal region. She had observed the lump for about two years. A slight prominence was visible a little to the right of the mesian line of the fissure between the nates. When the finger was introduced at the anus a body of considerable size was to be felt in the loose tissue between the rectum and the interior surface of the coccyx. Lately, the patient had felt much pain in the part, although it had usually been painless. There were no well-marked indications to lead to an accurate diagnosis of the nature of the growth, and therefore I made an incision through the integuments to ascertain its character. A cyst was immediately exposed and excised. This operation was not easily accomplished, for it extended deeply by the side of the coccyx behind the rectum, in the loose connective tissue of that region. Probably the dense, fibrous, unyielding texture of the tissues of the part prevented the cyst from developing itself superficially, and therefore it passed backwards into the pelvis. The mass removed was about one inch in diameter and consisted of a

fibrous cyst, with a thick coherent mass within, in the centre of which was a collection of sebaceous matter. The wound healed quickly.

**CASE VI.**—*Large sebaceous cyst in labium pudendi, of twelve years' duration, bursting and emptying its contents at intervals; excision; cure.* (Drawings 159<sup>85</sup>, <sup>86</sup>. Prep. 1654<sup>86</sup>.)

A woman from the country, æt. 39, was admitted under my care in March last, who had a large pendulous tumour from the left labium pudendi. It had been there twelve years, although of variable size, in consequence of the skin occasionally ulcerating and allowing the fluid contents to escape. The integuments covering the tumour were thick, the cutaneous follicles very distinct, but, upon grasping the neck of the mass, the fluctuation of fluid was very distinct. It was clearly ascertained that it had no relation with the round ligament or inguinal canal, for, as it lay on the patient's thigh, it assumed the appearance of a large labial hernia. Excision offering the best and speediest prospect of cure, the operation was performed by removing a portion of integument with the cyst entire. It was firmly attached to the crus clitoridis. The cyst was thick, composed of fibrous tissue, and the lining membrane, the surface of which was curiously reticulated, consisted of epithelium. The contents of the cyst closely resembled gruel, or a mixture of flour and water, and measured more than half a pint. The elements were epithelial scales and fatty matter. The patient quickly recovered the operation, and left the hospital greatly relieved of her burden.

The sebaceous tumours of the integuments of the head require a special notice, because they exhibit marked structural peculiarities. Growths of a similar kind are, however, occasionally seen in other parts of the body, of which an illustration is afforded by Case XXI. The chief peculiarity consists in a thick, dense, horny capsule, which is closely in contact with the tunica propria and fibrous envelope of the original gland. This horny capsule was formally regarded as the cyst wall altered by pressure, until Mr. Prescott Hewett demonstrated its true relations and anatomical structure, at his lectures at the Royal

College of Surgeons. It is now clearly proved, that when one of these sebaceous tumours is squeezed out after the division of the skin, that the fibrous cyst remains behind. This cyst can be afterwards excised, and its structure is identical with that of all the others. But the construction of the horny capsule requires explanation. If carefully examined, it is found to consist of epithelium, layer upon layer, mixed up with sebaceous matter. Sometimes a solid mass of epithelium is formed, in other instances a cavity exists in the centre, filled with soft sebaceous secretion. This capsule, then, seems to be a production or excessive development of the epithelium of the sebaceous gland, which, being subjected to the pressure of the unyielding textures in which the tumour is developed, becomes converted by slow degrees into a tissue closely resembling horn or fibro-cartilage.

To effect the removal of these sebaceous tumours of the scalp, it does not appear to be so absolutely necessary to excise the fibrous cyst as in the variety of the complaint before described. For it is a very common practice simply to incise the scalp over them, and then eject them from their bed with a little pressure and the handle of the scalpel, after which they do not reappear.

CASE VII.—*Seven encysted tumours on the scalp.*

A healthy girl, æt. 19, came to the hospital in 1853, on account of having several small lumps on her head. They were mostly on the vertex, and although they gave her no trouble she was anxious to have them removed. Seven of these encysted tumours were excised. They varied between half an inch and an inch and a half in diameter. The smallest were solid, but the larger growths had a central cavity filled with soft sebaceous matter. All the wounds healed well, without the least inconvenience.

When of long duration, the encysted tumours of the scalp often form very large pendulous sacs, which contain a great quantity of sero-sanguineous fluid and very little solid matter. Laminæ of cholesterine are usually very abundant in the fluid of these cysts.

CASE VIII.—In 1848, Mr. Hilton removed from the occipital region of a woman, æt. 58 years, a very large cyst of this nature. It had been growing thirty years, and was about five inches in diameter. The size and weight of the growth produced great inconvenience, and this circumstance alone induced the patient to submit to its removal. The integumental covering was very thin. The cyst was delicate; it contained about half a pint of fluid, of the colour of raw umber, in which floated a large quantity of cholesterine crystals. The patient recovered.

CASE IX.—I removed, in 1853, a large cyst, with its contents, from the occipital region of a lady, æt. 68, where it had been growing many years. It had become inflamed by pressure and its size, and was painful and inconvenient. The operation was perfectly successful.

It is always necessary to remove the cyst in these cases, and if the integuments have been very much stretched, a portion of them may likewise be excised.

When patients will not submit to the removal of these wens by a cutting operation, recourse may be had to the plan which was adopted in the next case. It is tedious, painful, and troublesome, but perfectly effective in accomplishing the object desired. In this instance I used nitric acid, but any strong escharotic would answer equally well.

CASE X.—*Sebaceous tumour on scalp; inflamed by the application of nitric acid, and removed.*

A woman, æt. 63, applied to me with an encysted tumour of medium size in the scalp, a little to the right side of the occiput. I applied the strong nitric acid over about an inch of its anterior surface. This produced destruction of the integument and inflammation of the cyst. About ten days afterwards the cyst began to discharge its contents, which were very fluid. She came to me a few days afterwards, when I removed the cyst by means of gentle traction. The wound healed rapidly, and a very small cicatrix was the result.

The sebaceous cysts are not always situated immediately

beneath the skin, but, as the ensuing case shows, are deeply seated beneath muscular tissue. Hairs are also found in the cyst.

*Cyst with sebaceous contents, and hairs growing out of its walls.*

CASE XI.—A man, æt. 19, came to the Hospital and showed me a swelling at the external extremity and upper border of the right eyebrow, which had been there as long as he remembered anything. It had lately enlarged and become painful. Mr. Nason excised the cyst, which, when distended with its contents, measured about half an inch in diameter. The fibres of the orbicularis palpebrarum muscle covered the cyst, and were detached from it without difficulty.

The cyst contained sebaceous matter and hair. When the lining membrane was turned outside and floated in water several delicate hairs were seen growing from it. The preparation (No. 1668<sup>25</sup>) illustrates this formation very well. The wound healed without trouble.

CASE XII.—In the museum is a very curious preparation (No. 1651), which shows a cyst filled with hair, growing by the side of the orbit, and extending into the cavity. Unfortunately there is no history of it.

When a cyst has existed for many years, and attained considerable dimensions, the integuments often become acutely inflamed and ulcerated. The action extending to the cyst, induces its separation from the surrounding textures, and it is easily enucleated. An injury, as a blow or violent compression, occasionally gives rise to a similar result, as the following very well illustrates.

CASE XIII.—*Sebaceous cyst on the back of the neck, inflamed by an injury ; suppuration ; excision of cyst ; cure.*

In March last, a man, æt. 47, came into Guy's and showed the back of his neck, upon which there seemed to be, from the appearance, a large carbuncle. Upon inquiry it was ascertained that a sebaceous cyst had been there for some years, and that he had ruptured the cyst by pressure a few days

before admission. This injury had induced inflammation, and now the integuments for some distance around were red, swollen, and very painful. There was a small opening into the cyst which allowed the escape of pus and sebaceous matter. This was enlarged, the cyst excised, and the wound rapidly healed.

Sebaceous cysts of long standing sometimes become affected with a kind of chronic inflammation and assume the outward appearances of malignant disease.

CASE XIV.—I was requested by my friend Mr. Henry Wakefield to consult with him upon the case of a lady, æt. 73, who had had a sebaceous tumour over the left scapula for a great many years. During the last few weeks it had been very painful, the skin over it was red and purple, and the external appearances were strikingly those of a cancerous growth. It had, in fact, assumed what the older pathologists would have called "a malignant action." When, however, we instituted a careful examination, a spot in the middle of the growth was discovered, at which the lady stated the contents had sometimes oozed out, and a probe being introduced it at once led to the explanation of the case. This opening was slightly enlarged, the contents of the cyst removed, in a few days afterwards the cyst came out, and the disease remained permanently cured.

The last was a case of a hard tumour. But, when the contents of a cyst are soft or nearly fluid, and the disease occurs in parts in which medullary cancer is frequently developed, when the history of the case, the age of the patient, and the constitutional nutrition of the individual, coupled with the outward manifestations of that disease, all lead to the supposition that the disease may be cancer, it is sometimes difficult to arrive at an accurate diagnostication. A case of this nature was the following.

CASE XV.—*Encysted tumour close to the mammilla, assuming the outward appearance of medullary cancer ; excision.* (Drawing 176<sup>63</sup>, Prep. 1654<sup>60</sup>.)

A medical man from Canada was sent to me by my friend Mr. Brenchley, of Brighton, in 1855. He showed me a large tumour on his chest, close to the right mammilla which seemed to be intimately connected with it. He was a healthy-looking gentleman, sixty-nine years old, with a slight tendency to obesity. About ten years before he first felt a small lump near the right nipple, which was painless, and it had slowly increased since that time. This gentleman's report of his own case was as follows : "The tumour was quite small in 1844-45. From the first it was of a bluish colour and soft, growing gradually. In 1850 it was about the size of a hen's egg, several hard nodules were perceptible, it was of a darker blue colour, some spots were soft, and it was a little above the right nipple, but not connected with it. Darting pain occasionally shot through it, which seemed to be increased after taking any stimuli, as wine. The disease was regarded as malignant, and its removal was advised. In 1853 the tumour increased, and became more painful. The axillary absorbent glands were not affected. Being in London, I consulted Mr. Guthrie, and he strongly advised me to have it removed. In August, 1855, the tumour was increasing rapidly, and its size was inconvenient. The integuments were very thin, and, being apprehensive of ulceration, I consulted you." This patient showed a large new growth, about six inches in diameter, projecting from the right mammary region. The integuments were very thin, and in places, where the skin was thinnest, dark-blue or purple patches appeared, which closely resembled the surface of carcinoma medullare rapidly approaching ulceration. It was soft and elastic to the touch, but not painful. The axillary lymphatics were perfectly healthy. I confess I regarded the disease to be cancer, and recommended its removal in order to save the suffering likely to attend its progress.

I excised the growth in the usual manner, with a portion of the surrounding integuments. The wound healed favorably,

and the patient recrossed the Atlantic a few weeks afterwards. To the date of the publication of this report he continues quite well.

The disease consisted of a rather thick cyst, adherent to the skin on its anterior surface, but it was loosely connected to the other tissues surrounding it. It inclosed from three to four ounces of serum tinged with blood, and soft, brown, solid matter, which closely resembled the *débris* of a coagulum. The internal surface of the cyst was lined with thin layers of fibrinous-looking deposit, but I could in no part discover a growth of anything like carcinoma on the surface. The fluid was full of crystals of cholesterine, which floated in it.

Upon comparing this with a cyst containing fluid of a similar character and removed from the head (176<sup>65</sup>), they seem to be identical in structure and development, and there can be no doubt, I think, that the tumour in this gentleman's breast originated in a sebaceous gland, and that the subsequent changes depended upon the pressure and irritation to which it was ordinarily subjected.

The peculiar purple colour which the integuments covering these cysts assume after they have existed many years is very well depicted in a drawing by Mr. Hurst (196<sup>60</sup>).

CASE XVI.—A man, *æt.* 57, was admitted in a very low condition in 1857. He died from the results of enlarged prostate gland. For a great many years he had had a sebaceous tumour developed in the right temporo-frontal region. Within the last year or two it had enlarged rather rapidly—first became red, then purple, and the cutaneous capillary vessels were very distinct. The tint of the cutaneous covering in this instance closely resembled that of the same tissue described in the last case, and therefore was very like those forms of carcinoma of the mammary gland associated with cysts which contain fluid mixed with blood. Whilst calling the attention of students to the resemblance exhibited by some of the cystic and follicular growths to some varieties of cancer, I would refer them to the paper by Mr. Cock,<sup>1</sup> which is very well illustrated, and contains a description of the tissues com-

<sup>1</sup> 'Guy's Hospital Reports,' 1853, vol. viii, p. 151.



posing these growths, many of which I have carefully examined.

**CASE XVII.**—Another very remarkable case was subsequently in the hospital, which showed all the external characters of cancer, yet when examined carefully none of the elements of that disease were discoverable. The growth, in this instance, was developed on the back of a woman, æt. 50 (Drawing 176<sup>60</sup>), and had been growing many years.

When the integuments covering the cyst have ulcerated, and the cyst itself is empty, granulations spring up from its surface, which, growing rapidly, often assume all the characters of fungating cancer. The discharge from such a growth is offensive, a sanious fluid continually exudes, the skin around becomes excoriated, and if it be cut off it very soon becomes as large as before. The removal of the remains of the cyst with the growth is essential to the eradication and cure of this disease. Every portion of the new production must be excised to the healthy tissues beneath, and even a small portion of them, as fascia covering the muscle, may be advantageously taken away. The application of a ligature around the base of a growth of this nature is practically useless, and if escharotics be employed their action must extend to the healthy tissues beneath the cyst.

The two cases which follow were, I believe, of this kind.

**CASE XVIII.**—*Follicular growth on the back, forming a fungating, sloughing mass; removed; cured.* (Drawing 188<sup>28</sup>.)

A healthy-looking married woman, æt. 40, was admitted into Guy's in May, 1855, with a sloughing growth on the back, a little to the left side of the central fossa of the interscapular region. In the same spot there had been a black mole for many years. About fourteen months before admission a growth was developed from the surface of this mole, which was tied with a ligature, and it sloughed off. A fresh growth sprung up which was also ligatured, and soon after the third and existing development appeared. It had never been very painful, but was very inconvenient, and the odour from the

superficial ulceration and discharge unpleasant. The growth had lately advanced rapidly, and sprung from a pedunculated base, around which in the skin the remains of the mole were visible. I excised the growth and all the skin around it, with the black mole, to the extent of about one inch. The tissues beneath were healthy, and the growth was entirely confined to the cutis. The wound soon healed.

The new growth was composed of nucleated elements and nucleated fusiform bodies, many of which resembled the epidermis-scales in early formation.

I saw this patient about three years after the operation, when there was a healthy cicatrix.

*CASE XIX.—Follicular growth on cheek; excision; cure.*

A woman, æt. 58, came into Guy's with a growth on the right cheek, between the lower eyelid and side of the nose. It had been growing five years, and a portion was removed with caustic four years since. I excised the disease with a portion of skin, and the wound healed speedily. This growth was composed of minute nucleated cells and fibres. The disease consisted of a mass of granulations springing from a fibrous base, and was entirely confined to the cutis.

*CASE XX.*—I will here relate a case to show the necessity of great care in the examination of these new growths. A woman is at this moment under my care in the hospital with an ulcerated growth on the left labium pudendi. She says that it occupies the site of a lump which often formed, broke, and discharged during many years. This is clearly the history of a sebaceous cyst; but now there is a solid, projecting, ulcerated growth, with wart-like elevations around its base. The inguinal lymphatic glands, too, are large, but this enlargement might arise from mere irritation. I removed the growth tolerably freely, and, after a careful examination, I found the old cyst almost collapsed by its side, but perfectly independent of it. The minute elementary structure of the new growth was that of epithelial cancer. The coincidence of epithelial cancer close by the side of an old cyst is certainly remarkable.

I shall conclude this relation of the cases of sebaceous cysts, and the changes which take place in them during their progress in individual instances, with an account of a patient who had eight growths of this kind in various regions of the body. All the tumours differed in their outward appearances and to the touch, but they resembled each other in their minute elements and general conformation.

**CASE XXI.**—*Sebaceous tumours on head and trunk, eight in number; removal; cure.* (Drawings 176<sup>63</sup>, 176<sup>64</sup>, 176<sup>65</sup>, Prep. 1654<sup>65</sup>.)

M. S—; æt. 48, was admitted under the care of Mr. Birkett in December, 1855. She was a cachectic-looking, married woman, living at Strood, in Kent, where she obtained a precarious livelihood by hawking fish. For many years she had been troubled with “wens” on her head and back, but only one of them had been a source of very great annoyance. This one was seated on the back, close to the root of the neck. It was ulcerated, and continually discharged a thin puriform fluid. Upon two occasions a ligature had been applied around the base of this growth by a surgeon, and it was thus removed. This fungating cyst was the first noticed, about twenty years since, but it resembled, for many years, some of those now existing. It inflamed and ulcerated between two and three years since. Near the peduncle of its attachment to the skin was a dark-brown warty growth, where a “mole” had existed many years.

On December 15th I removed eight growths; five from the head, three from the back. The patient left the hospital quite well, January 29th, 1856.

Commencing at the vertex of the head, the anatomy of the growths was as follows:

No. 1. A thin-walled cyst, lined with epidermis-scales, which contained yellow sebaceous matter of soft consistence. This was composed of epidermis-scales and fatty matter only.

No. 2. Situated above and behind the left auricle; had thin walls, was very soft, and contained yellow, nearly fluid, substance, in which were epidermis-scales and fat.

No. 3. Smaller than the two described, situated over the

posterior termination of the sagittal suture; had thick, dense walls. There was a cavity in the centre, partly occupied by greasy matter, in which were epidermis-scales and fat.

No. 4. The largest, softest, and almost pendulous, was a thin-walled cyst. It contained fluid of a dark colour, resembling coffee-grounds. Adherent to the lining membrane of the cyst was a soft substance, like the fibrine of the blood.

No. 5. Growing at the summit of the right side of the back and root of the neck; showed all the external appearances of a fungating cancer. It was somewhat pedunculated, irregular, fissured and lobed on its surface, and a secretion of a sero-purulent nature ran from its surface. Its attachment was simply dermic, but its arterial supply was rather large. Its elementary composition was epidermic scales, fibre-tissue, nucleated bodies, and fatty matter.

No. 6. Was developed over the inferior angle of the left scapula. It had a wall of medium thickness, and it was filled with sebaceous matter, of the ordinary consistence and composition.

No. 7. The most solid and the hardest of all, situated at the upper part of the left lumbar region; was very firmly attached to the integuments, and the surface was red, as if about to ulcerate. The cyst was leathery, and the mass cretaceous.

No. 8. Which is not figured in the drawing, was in the scalp, a little in front of the vertex of the head. It was the smallest, had very thick walls of a concentric formation, leathery, almost cartilaginous, and it contained sebaceous matter. (Prep. 1654<sup>55</sup>.)

## II. CYSTS IN RELATION WITH THE GLANDS WHICH SECRETE MUCUS.

Exactly in the same manner as we trace all the elements of the sebaceous glands in the tumours designated "sebaceous," so can we discover the anatomical structures of the mucous glands in those cysts which contain mucus. In all those portions of the mucous membranes within reach of sight, closed sacs containing mucus are very frequently seen; thus, upon the inside of the lips, on the floor of the mouth, or in the sub-

lingual region, and in the walls of the vagina. Even in regions out of sight they are developed, as the interesting paper of M. Giraldès<sup>1</sup> instructs us.

The designation of such cysts might well be derived from the name of the locality in which they are developed. Thus I shall describe in succession—1, Labial mucous cysts; 2, Sublingual mucous cysts; and, 3, Vaginal mucous cysts.

I will here refer the reader to the description given by Kölliker of the anatomy and relations of the mucous glands, and, by an examination of the woodcuts which illustrate that work, he will see how easily these small lobulated glands may be converted into a simple sacculus or cyst, by a dilatation of their walls. This results from an accumulation of secretion, depending upon an obstruction of their excretory duct.

"The glands which secrete mucus," writes Kölliker, "agree in the essential characters of their intimate organization, and invariably consist of a certain number of glandular lobes, with a branched excretory duct. The lobes, of which in the simplest glands only a few exist, are in their circumference generally elongated, pyriform, or rounded. They consist of a number of coiled canals, presenting numerous simple or compound vesicular diverticula, and appear to be the immediate continuations of the excretory ducts of the lobes which, as soon as they have entered the latter, usually, without diminishing in diameter, break up successively into a certain number of them."<sup>2</sup>

Every mucous gland is composed of an envelope of connective tissue, the tunica propria, and a layer of epithelium. When simple they are flask-shaped; if compound, they are lobulated. The first kind require to be simply dilated by accumulated secretion to convert them into a mucous cyst, and the same action may change a lobe of the gland, or the whole organ, into a closed sac.

In a mucous cyst, then, we find all the elements of a mucous gland. The cyst is, in fact, but the envelope of connective tissue, perhaps more fibrous and condensed. The tunica propria is recognised lining the wall of the cyst, and the epithelium

<sup>1</sup> 'Mém. de la Soc. de Chir. de Paris,' t. iii, p. 479—"Des Kystes muqueux du sinus maxillaire," par J. A. Giraldès.

<sup>2</sup> Kölliker, op. cit., vol. ii, pp. 25, 26. See woodcuts, figs. 178, 179, 180.

forms a layer over it. The secretion of the gland constitutes the contents of the cyst.

### 1. LABIAL MUCOUS CYSTS.

We cannot find a better illustration of the mucous cysts than in those which are developed on the inside of the lips. On these organs, especially the lower lip, they are of frequent occurrence, and from their size, their relations, and their locality, they do not seem to be liable to those circumstances which often, in other parts, induce an altered state of the retained secretion, particularly if the complaint has been of long standing. A labial cyst may be easily excised entire, and submitted to careful examination. A delicate capsule of fibrous tissue is then found, lined with the membrana propria and epithelium. The contents of the cyst are a tenacious, slimy mucus, which draws out into threads, like the albumen of an egg, and resembles the secretion from the mucous glands of the mouth when any part of that region is under irritation. This is particularly observable during the time of excising a portion of a lip or of the tongue. It is of a pale-yellow tint, and does not readily mix with water.

The cases which ensue illustrate the ordinary characters of this complaint.

#### CASE XXII.—*Labial cyst.* (Plate I, fig. 2.)

In March, 1852, one of the female out-patients, æt. 43, showed a small growth on the inside of the lower lip which formed a circumscribed projection, and had been noticed four months. By dividing the mucous membrane over it I was able to excise the whole without opening the cyst. The wound healed in a day or two. A careful examination under water showed a minute portion of a mucous gland attached to the outside of the cyst-wall. Examination of this, with the help of the microscope, showed that it consisted of the cæcal terminations of the ducts filled with epithelium. The cyst was next opened, and its contents were ropy, tenacious, clear mucus, in which epithelium-scales floated, like those of the gland-tissue. The

lining membrane of the cyst showed likewise epithelium identical with that of the mucous glands. The lithograph shows this little cyst. From this examination it would appear that a portion only of a mucous gland is necessary to the development of one of these cysts, perhaps a lobule merely.

Last year I removed one of these labial cysts from the inside of the lower lip of a gentleman in consultation with Mr. Bayfield. It showed all the characters as above described.

CASE XXIII.—*Labial cyst.* (Plate I, fig. 1.)

A boy, *æt.* 12, was brought to me with a swelling on the lower lip, a little to left side of the median line. It occupied part of the prolabium, but evidently originated beneath the mucous membrane of the inside of the lip. Attention was first called to the swelling six months before, but the last few weeks it had increased rapidly. The lithograph, by Mr. Hurst, delineates very well the relations and size of the new growth. Its translucency, defined limits, superficial relations, and elasticity to the touch, clearly indicated its cystic character and contents. An incision was made into it, when ropy, pale-yellow mucus escaped. When this mucus was entirely wiped away, the smooth, delicate surface of the cyst was seen, which seemed to be identical with that of an ordinary mucous membrane. The cyst contracted and the incision nearly healed, but from the aperture which remained mucus continued to flow. I attempted, as long as I saw the case, to establish this opening as an artificial duct. It cannot, I think, be doubted that the disease originated in a mucous gland, the duct of which, being obstructed, prevented the escape of its secretion. This, accumulating, dilated the tunica propria of the gland-structure, as well as its envelope of connective tissue, into a cyst or closed cavity, which still retained its lining-membrane of epithelium and functional activity, as was proved after an incision had been made into it.

A small growth will occasionally spring from the mucous follicles of the lip and simulate an epithelial cancer. Doubtless, many of the cases of ulceration of the lip stated to be

cancer, have been of this nature. Excision of the growth, and of the cyst from which it proceeds, effects a cure. Of such a nature was the next case.

CASE XXIV.—*Follicular growth on upper lip.*

A lady, about 50, had a growth in the centre of the upper lip, which occasionally bled, and was usually covered with a dry eschar. It had been growing a few months, and was sometimes painful. I excised it; the wound healed favorably, and there had been no return of it in four years. It was composed of nucleated elements resembling epithelium, and appeared to have been a growth from a follicle of the cutis or mucous membrane.

A drawing (Drawing 230<sup>80</sup>, and Prep. 1678<sup>5</sup>) in the museum shows that horny growths likewise spring from the follicles of the lips, and in a man whom I had under my own care a few years since the disease was of a like nature. In both cases the growth and follicle were excised, and the disease thereby cured.

## 2. SUBLINGUAL MUCOUS CYSTS.

We now approach a class of cases concerning the nature and origin of which a strong controversy has been carried on from the earliest times to the present day. The disease termed "ranula" has its seat in the sublingual region. It is usually thus defined: "A tumour under the tongue, arising from an accumulation of saliva and mucus in the ducts of the *sublingual* gland."<sup>1</sup> Others have assigned its origin to a dilatation of the duct of the *submaxillary* gland, or "Wharton's duct." Dupuytren regarded many of these cysts as morbid states of the mucous follicles.<sup>2</sup> And more recently, in 1841, Fleischmann has ascribed their formation to the distension of bursæ mucosæ which he discovered under the tongue.<sup>3</sup> M. Jobert has divided these swellings into three classes:

1. *Ranula salivalis*, which depends upon a dilatation of Wharton's duct.

<sup>1</sup> Cooper's 'Surgical Dictionary,' Art. "Ranula."

<sup>2</sup> 'Lec. orales de clin. chir.,' Paris, 1833, t. iii, p. 295.

<sup>3</sup> Fleischmann, 'De novis sub lingua bursis.'



2. *Ranula mucosa*, which is said to take its origin in Fleischmann's bursa.

3. *Ranula follicularis*, as described by Dupuytren.<sup>1</sup>

This classification of M. Jobert comprehends, I believe, all the cases which are likely to fall under the notice of the surgeon. Those of the first class must be extremely rare, nevertheless the fact of their existence rests upon incontestable authority.<sup>2</sup> I have no case to record, and therefore refer the reader to the authorities cited. Considerable doubt hangs over the exclusively personal opinion of Drs. Stromeyer and Fleischmann, that a bursa mucosa always exists under the tongue. The special anatomical investigations of M. Bertherand,<sup>3</sup> to which I would here add the results of my own dissections, fail to discover this bursa. All the cases I have to record belong to the third class, and as they are numerous, and the cases offered opportunities for careful examination, let us see if there are any special glands in the sublingual region, the morbid condition of which may explain the disease. On careful examination of the lateral sublingual regions, a little posterior and external to the carunculæ sublinguales, the observer detects the mouths of the ducts of several minute glands which are known by the name of the "ducts of Rivini." The glands may be likewise termed the "glands of Rivini." These are independent of the sublingual gland, the duct of which is said to terminate in that of Wharton.

If we now refer to the description of the glands of Rivini by M. Kölliker, we shall find the following statements :

The ducts of *Rivini* are the excretory canals of from six to twelve small mucous glands, situated in the mucous membrane at the sides of the tongue and on the floor of the mouth. These ducts "are filled, in man and animals, with the same yellowish, viscid, amorphous fluid, coagulating into threads by the action of acetic acid, which is met with in the

<sup>1</sup> Jobert (De Lamballe), 'Traité de chir. plastique,' Paris, 1849, t. i, p. 400. I would refer the reader to the most complete account of this disease, by Albert Haller, of Dorpat, in 'Deutsche Klinik,' 1851, No. 21, and following numbers.

<sup>2</sup> 'Mémoires de la Soc. de Chir. de Paris,' t. ii, p. 219—"Mém. de la Grenouillette," par M. Forget; and, op. cit., t. iii, p. 492—"Sur la dilatation des conduits excréteurs des glandes parotide, sous-maxillaire," &c., par M. Jarjavay.

<sup>3</sup> 'Thèse de M. Bertherand,' p. 16, Strasbourg, 1845.

ducts of the small mucous glands, while the glandular vesicles themselves also contain abundant mucus. From all that has been said," Kölliker writes, "it would seem that Rivini's glands, as I will call them, must be excluded from the class of salivary glands, and, as regards the three larger glands, their secretion does not appear to be identical, but sometimes to contain mucus (submaxillary and particularly the *sublingual*), sometimes to want it (parotid.)"<sup>1</sup>

Accepting M. Kölliker's description of the anatomy and function of the glands of Rivini to be correct, we seem to have arrived at a fact which would explain in a highly satisfactory manner the origin of the mucous cysts under examination. It has been long known that the mucus contained in many of these cysts does not afford any trace of salivary secretion, which must have been found had the fluid they contained been secreted by a salivary gland. The tenacious, albumen-like fluid of these cysts differed also in its physical characters from saliva, but this alteration in its qualities was explained by its long retention. Every body knows the quantity of saliva secreted during mastication, yet we do not find these cysts enlarge during that process. And, further, as I shall presently demonstrate, in every case I have recorded, the ducts of all the *true salivary* glands were not obstructed, for the secretion escaped freely from their orifices.

Therefore I submit this proposition to the profession—That the sublingual cysts depend upon a morbid state of the glands of Rivini, in the majority of instances; that they must be placed in the same category as other mucous cysts, as those of the lips, for example, which no one ever doubted originate in the mucous glands; and, without denying that the obstruction to the duct of a salivary gland would give rise to an accumulation of saliva, that the disease is very rare, whilst that of which a description of cases is about to be given is very common.

In Plate II, fig. 2, the situation of one of these sublingual mucous cysts is delineated. It was drawn from a select example of the disease, but it fails, from absence of colour, in

<sup>1</sup> Kölliker, op. cit., vol. ii, p. 36.

showing that which is one of the most characteristic features. Usually, the colour of the entire surface is of a bluish or a purplish tint, and the minute capillary blood-vessels may be seen ramifying in the mucous membrane covering it. (Drawing in the Museum 229<sup>38A</sup>, 229<sup>39</sup>.) The outline of the swelling is rarely symmetrical, although in one case I found it perfectly so (Drawing 229<sup>38A</sup>); but it generally projects most upon that side of the frænum linguæ in which it commenced (Drawing 229<sup>39</sup>), or even forms large elevated tumours, as in Drawings 229<sup>35</sup>, 229<sup>38</sup>. A projecting fleshy mass, lying beneath the left side of the tongue, was very marked in a case among the female out-patients in 1850 (Drawing 229<sup>35</sup>), and some care was required to ascertain the precise nature of the complaint. In this case the line formed by the orifices of Rivini's duct was clearly seen. In the plate, the relation of Wharton's duct to the swelling is shown by the introduction of the probe at its orifice.

The disease occurs in infancy, and most frequently, it would seem, in early life. There are recorded cases of congenital ranula, but most of the patients coming under my observation have been between twenty and thirty years old.

Various plans have been proposed and adopted to effect a cure of the disease, some with the view to obliterate the cyst, others to establish a permanent opening in its walls, by which its contents may escape. The principle to be kept in mind in the treatment of these cases is the same as must guide the surgeon in regard to all the mucous cysts. Enucleation of the cyst, or its obliteration by adhesion of the walls, is the most certain cure of the complaint. For, as certainly as any part of the secreting surface continues its functions, so surely the secretion will accumulate. Thus, simply incising the cyst and evacuating its contents fails to induce a radical cure. The injecting of stimulating fluids sometimes succeeds, but often fails. Exciting inflammation and suppuration of the sac is the most certain source of radical cure, and various measures may be adopted to effect this action. The ensuing relation of the cases which have fallen under my own treatment illustrates the therapeutics of the subject.

CASES OF SUBLINGUAL MUCOUS CYSTS, THE SO-CALLED  
"RANULA."

CASE XXV.—A girl, æt. 23, was admitted into Guy's under my care, and the case is reported by Mr. Francis Clowes. A month before admission she perceived a swelling in her mouth, on the right side of and beneath the tongue. It had slowly increased since that date. It gave her pain occasionally. The sublingual region was occupied by a swelling which raised the tongue, and was of a blue tint. It was to the right side of the frænum linguæ, but it elevated the caruncula sublingualis, and extended over to the left side. Mr. Birkett freely laid bare the cyst, which clearly contained fluid, and traced the duct of the right submaxillary gland from the right caruncula downwards and inwards over it. He passed a punctum probe along it to a considerable depth, thus clearly demonstrating that there was no obstruction in it. Besides, the secretion from this gland flowed freely from the orifice of the duct. A further attempt was made to excise the cyst, in doing which it was cut, and its contents escaped. The fluid it contained was of a pale yellow colour, very tenacious, running out in long strings and slightly turbid. When the cyst was emptied the compound tincture of iodine was injected. The cyst was slightly inflamed by this, and the dresser subsequently kept the opening free by introducing a probe daily. Ten days after the injection she left the hospital well.

*Sublingual cyst ; inflammation and suppuration ; cure.*

CASE XXVI.—B. T—, æt. 33, a cachectic-looking woman, came under my care in May, 1855. For some years she had suffered with "bleeding piles." She showed me a large swelling, occupying the floor of the mouth which elevated the tongue and interfered with her usual vocal articulation. It commenced five or six months before, like a small pimple, in the mucous membrane between the side of the tongue and lower jaw, at the spot where the orifices of Rivini's ducts are seen. This enlarged and slowly spread over to the left side. It was manifestly an example of the disease called "ranula."

The tense, thin cyst-wall, covered by the mucous membrane, was of a purplish tint. The carunculæ sublinguales were pushed forward by the cyst, and I passed a probe easily into them and along the ducts of the submaxillary glands, to ascertain if they were obstructed. They were not; for, independently of this test, the secretion from these glands flowed freely from the mouths of their ducts. I exposed the surface of the cyst, on the right side, to a wide extent, by dividing the mucous membrane and reflecting it, hoping to be able to excise it entire. During this operation I distinctly saw the duct of Wharton running over the cyst, and demonstrated it more clearly by passing a probe along it. The lingual gustatory nerve was also seen at a little distance from it. The mucous membrane had been detached from the whole of the anterior surface of the cyst, when its coats were torn and the contents escaped. The fluid was of the same kind as that which I have always seen in these cysts—tenacious mucus, drawing out in long threads. I excised a large piece of the cyst, and, passing my finger into the cavity, I could touch the os hyoides below, and pass it across beneath the tongue to the left side of the lower jaw. This piece of the cyst was composed of fibre-tissue, and its smooth surface was covered with pavement epithelium. A piece of lint was introduced, the cavity diminished in size, and as the wound healed, she left the hospital, after about sixteen days' residence therein, apparently well. For about a month it continued well. Then the swelling reappeared, and she applied to me when it was about half the size it had reached at her first visit. I inserted some silk, passing it through the cyst from side to side, and tying it there. This treatment was continued for two months, and the cyst seemed then to become obliterated. It was not, however, cured. In the following October she came into the hospital, suffering intensely with pain extending over the whole of the oral and buccal regions, and great difficulty in articulation, deglutition, and opening her mouth. The cyst was again very large, and I opened it on the left side of the frænum of the tongue. A large quantity of fluid escaped. Inflammation having attacked the cyst and surrounding parts, I thought it a good opportunity to excite suppuration, and I passed a seton through it from side to side. In a few days,

suppurative action was freely established, the surrounding inflammation subsided, and, by keeping a thread of silk in the openings for two months, the disease was cured. I saw this patient in June, 1857, when she was quite well.

CASE XXVII.—*Sublingual cyst of long duration; incised; spontaneous rupture of cyst; a portion of cyst excised; injection of Tinct. Iodinii compos.; insertion of Argent. Nitrat.; cured.*

One of the nurses in Guy's, æt. 23, showed me a sublingual cyst which extended across the floor of the mouth. She had been troubled with it for nearly three years, during which time it had been twice lanced, and had repeatedly broken spontaneously. The cyst ruptured about a month since, became nearly empty, healed, and then filled again. There was no obstruction of either of the submaxillary ducts. I exposed the surface of the cyst by reflecting the mucous membrane covering it, and excised a large piece of it. This incision allowed about two drachms of a ropy, pale-yellow mucus to escape, which in its consistence resembled the albumen of an egg. I then introduced a piece of lint and Tinct. Iodinii compos., which did not give much pain. After a day or two this was repeated, but the case was not cured by this treatment. The continual secretion of mucus seemed to prevent the action of the iodine from effecting any good result. I then coated the end of a probe with nitrate of silver, and introduced it into the cyst, rubbing its walls with it until it had dissolved. After this had been done a few times, the cyst contracted, and when I last saw the patient I thought the disease was cured.

CASE XXVIII.—*Sublingual cyst occurring in childhood.*  
(Drawing No. 229<sup>89</sup>.)

A little girl, æt. 3½, was brought to me with a cyst which was formed in the left sublingual region, and slowly extended across to the right. It had been observed two months. I tied a seton through it. In a few days the mucus had all run out, the silk was removed, and it appeared to be cured. A

month after this the cyst had again filled, and I put in another seton, the result of which I never had an opportunity of witnessing.

CASE XXIX.—*A sublingual cyst on the right and left side.*

A delicate, strumous little girl, æt. 4, came to my house with two sublingual cysts, one on the right, the other on the left side of the frænum. Her mother observed, about a month before, a blue elastic swelling in the sublingual region. I incised the right cyst, and the mucus escaped freely, leaving the left. A week after, the right seemed to be well, and I then opened the left, from which ropy mucus was likewise discharged. I did not see the child again.

In both these cases the secretion from the submaxillary glands flowed freely from the orifices of their ducts.

CASE XXX.—*Sublingual cyst, incised, and cured by insertion of platinum wire.*

A domestic serving girl, æt. 22, was under my care in December, 1855. Her general health had been always good, although her aspect was not that of robust health. About three weeks before admission she felt a small pimple under the tongue on the left side. Soon after this she observed a swelling which slowly enlarged. The left sublingual region was occupied by a cyst containing fluid which stretched across beneath the frænum, making it difficult to determine to which side the cyst really belonged. Wharton's duct—the left—was traced along the outer wall of the cyst, and from its orifice the secretion of the submaxillary gland flowed freely.

I incised the cyst and passed some silk threads through it, which were tied together and left there. The ordinary ropy, tenacious mucus peculiar to the cyst was evacuated, its walls contracted, and the case seemed cured. It continued well two months, when she again came to me, the cyst being nearly as large as at first. I evacuated the mucus, passed a piece of platinum wire through its walls, and, twisting the ends together, left it there. She kept this in her mouth for

about a month, when the disease being apparently cured, I removed it. I believe the disease did not reappear.

CASE XXXI.—*Sublingual cyst, extending below the lower jaw ; suppuration of cyst ; cure.* (Pl. II, Drawing 229<sup>34</sup>.)

Mr. Edward B. Terry gave the following report of this case.

M. A. Lacey, æt. 20, was admitted into Dorcas under Mr. Birkett, in August, 1855. She was a healthy-looking girl, whose general health was very good. She said that five months before she received a blow on the left side of the lower jaw, which gave her much pain and caused a slight swelling below it, which gradually increased. There was to be seen a large swelling, extending from the left ear to the right submaxillary region, which was soft, diffused, and tender to the touch, but it gave no distinct fluctuation. She experienced considerable pain in the part which prevented sleep, and she was unable to masticate on the left side, although the movement of the lower jaw caused no pain. Looking into the mouth, when the tongue was elevated, a tumour was seen beneath that organ, which had a bluish tint, and evidently contained fluid. The caruncula sublingualis of the left side was pushed a little out of its usual site, but the orifice of the duct opening upon it was unobstructed, and the secretion of the left submaxillary gland flowed freely from Wharton's duct. Mr. Birkett passed a probe along this duct, the course of which could be clearly seen over and to the outside of the cyst.

An incision was made into the cyst, from which coagula of blood, pus, and mucus escaped in considerable quantity, whereby the tumour on the outside of the neck nearly disappeared. A piece of lint was inserted in the wound, and fomentations applied outwardly. This treatment relieved her from all pain for a few days, but as the aperture nearly healed in the mouth, although lint was kept in it, the external swelling became larger, the integuments inflamed, and nature formed an opening below the jaw. From this pus and mucus were discharged, and the cyst continued to suppurate for several days. By degrees the cyst contracted, and considerable induration was formed in the sublingual region. In about a



month the external wound healed, and the disease was cured. During the whole time the patient was under observation the secretion flowed freely from the left duct of Wharton.

Suitable remedies to meet the constitutional conditions of the patient were given during the treatment of the case.

In sublingual cysts of long standing the contents become much altered. An illustration of this condition was afforded by a case in the hospital under the care of Mr. Hilton, which he intends to publish. A drawing, showing the appearances exhibited by the disease, is in the museum (No. 229<sup>36</sup>).

### 3. VAGINAL MUCOUS CYSTS.

The labia pudendi frequently have mucous cysts developed in their textures, as well as those which depend upon a collection of sebaceous matter. In those surfaces of the labia covered by skin sebaceous glands are found, and upon those parts in contiguity with the nymphæ the mucous glands abound. Hence the distinction between the contents of these cysts as they are developed outwardly or inwardly towards the vaginal mucous membrane. Like other mucous cysts from different regions of the body, these consist of a fibrous capsule, and the tunica propria covered with epithelium. The fibrous cyst is often very dense and strong, a circumstance which renders its enucleation comparatively easy. The contents of these cysts vary. Often they consist of ropy mucus, like albumen, identical with that of the sublingual cysts. As a consequence of irritation, or of long retention, the physical characters of the fluid become, however, changed, offering varieties in colour, consistence, and composition, referrible to such circumstances.

The radical cure of these cysts, is ensured by completely cutting them out. If this be objected to, an incision being made into the cyst, the contents must be pressed out and the cavity filled with lint, to excite inflammation and suppuration.

CASE XXXII.—*Vaginal mucous cyst, recurrent after partial removal of the cyst; complete eradication; cure.*  
(Preparation 2281<sup>80</sup>.)

A married woman, æt. 28, came under my observation for the first time in 1853. She complained of a painful lump in the right labium pudendi which had been observed a few weeks. The mucous membrane covered it externally, and by touch a cyst containing fluid was clearly diagnosticated. An incision was made into it, the contents allowed to escape, and the cyst itself was supposed to have been dissected out. Subsequent examination, however, showed that it was deficient in one part. It was a mucous cyst, that is, it contained ropy mucus, and was lined with epithelium. The wound healed, and it was thought that the disease was entirely removed. In 1855 this patient again applied to me with a similar tumour in the same region. It was not so large as the last, but very painful. On this occasion great care was taken to excise the cyst entire, and the attempt was successful. It contained the same kind of thick tenacious mucus as the first. The lining membrane of the cyst was not uniformly the same in appearance throughout. One portion was of a bright-bluish tint, and looked as if it had been more recently formed than the remainder, which was thick, leathery, dark-yellow, and opaque. This last I believe to have been the piece of the first cyst which had not been removed at the former operation. The wound soon healed, and I have seen no more of the case.

CASE XXXIII.—*Vaginal mucous cyst.*

A married woman, æt. 32, was in the hospital in 1854, on account of a swelling in the right lateral wall of the entrance to the vagina. The mucous membrane was elevated by it. She had felt it two years, but of late it had been very painful when touched.

An incision was made through the mucous membrane, and

the cyst, with its contents, excised. It was about two inches in diameter, and consisted of a fibrous capsule lined with epithelium. The contents were a thick fluid, yellow, tenacious, and opaque. It contained epithelial scales in abundance. The wound soon healed.

CASE XXXIV.—*Vaginal mucous cyst ; excision ; cure.*

A girl, æt. 22, was in the hospital in July, 1854, on account of a tumour in the left wall of the vagina, close to the inside of the left nympha. Pain drew her attention to the part about five weeks before admission. When the mucous membrane was stretched over the swelling, its cystic character was very apparent. After dividing the mucous membrane, the cyst was enucleated. It contained yellowish, thick, ropy, tenacious, semi-fluid mucus, so closely resembling the contents of the sublingual cysts as to be identical. The lining membrane of the cyst consisted of epithelial scales. The wound healed favorably.

CASE XXXV.—*Vaginal cyst ; excision ; cure.* (Prep. 2281<sup>82</sup>.  
Drawing 397<sup>80</sup>.)

In January this year, a woman, æt. 32, was admitted under my care on account of a cyst developed in the left labium pudendi, which had been troublesome occasionally for nearly ten years. The diagnosis of the nature of the disease was very easy. When the mucous membrane was made tense over the cyst, the sensation communicated to the touch indicated a circumscribed collection of fluid. An incision was made through the mucous membrane, and the cyst, with its contents, excised. This was not so easily accomplished, for the growth extended deeply, and was very firmly adherent to the crus clitoridis, and several small arteries being divided, the hæmorrhage from them caused considerable interference. The cyst held about three or four drachms of yellow, tenacious, ropy mucus. Mr. Hurst has attempted to depict this in a

drawing, which represents the cyst cut open to show the smooth lining membrane, identical with that of the mucous membranes. It was quite impossible to distinguish between the contents of this cyst and those found in the cysts developed under the tongue, and passing under the name of "ranula."

The wound healed favorably, and the patient left the hospital well.

## PLATE I.

Fig. 1. Shows a cyst, with mucous contents, developed on the inside of the lower lip. The history of the case is related in the text. (Case xxiii.)

Fig. 2. A small cyst, removed entire from the lip. To the right border of the figure is a small portion of a mucous gland. (Case xxii.)

## PLATE II.

Fig. 1. Represents the swelling produced beneath the lower jaw by one of the sublingual cysts. The history of the case is given in the text.

Fig. 2. The appearance produced by the sublingual cyst when the mouth was opened and the tongue raised. A probe is introduced at the caruncula sublingualis, and passed along the duct of the submaxillary gland, which is pushed upwards and outwards by the cyst, but with which the cyst had no communication.

Plate I.

*Fig. 1.*



*Fig. 2.*



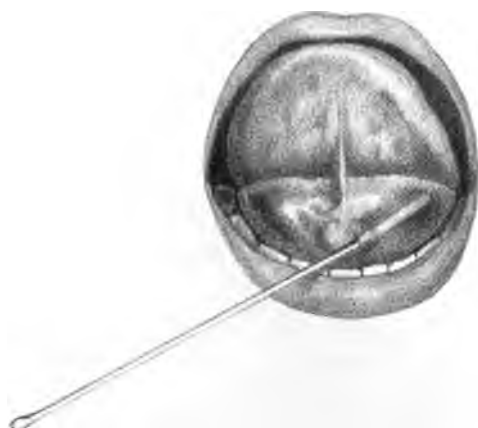


Plate II.

*Fig. 1.*



*Fig. 2.*







# CASES

OF

## ANEURISM OF THE CEREBRAL VESSELS.

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BY WILLIAM GULL, M.D.

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ANEURISM of the cerebral vessels has been regarded as a disease of extreme rarity, and judging by the scanty records of it, we should conclude that the opinion was true. This apparent rarity, however, like all negative conclusions, is doubtful, and I think there is the more reason to suspect it as only apparent and due to careless inquiry since the discovery of these cases has been much more frequent during the last ten years. There are several reasons why intercranial aneurism is likely to be overlooked. First of all, as here hinted at, it has not been looked for, and it is notorious that the eye can see only that it brings with it the aptitude to see. Again, when death occurs from rupture of the sac, recent coagula may so imbed and conceal it that unless strictly looked for it will not be found, for the sac is often small and thin and transparent, except at the point of rupture. Further, also, when death has taken place from changes around the aneurism, as by pressure or softening, the sac itself may present such appearances that unless a minute dissection be made of it, its true nature may not be discovered. Whenever young persons die with symptoms of ingravescent apoplexy, and after death large effusion of blood is found, especially if the effusion be over the surface of the brain in the meshes of the pia mater, the presence of an aneurism is probable.

Though intracranial aneurism generally occurs on the larger trunks of the vessels as they lie at the base of the brain, or in the fissures between its lobes, the smaller branches, after entering the cerebral substance, are not exempt. Dr. Crisp records the case of a boy, aged fourteen, who died from rupture of one of two small aneurisms on the anterior cerebral artery in the substance of the anterior lobe. In the seventh volume of the 'Pathological Transactions' is a case by Dr. Van der Byl, where an aneurism on the posterior cerebral artery lay in the substance of the brain, as a tumour of the size of a hen's egg, composed of concentric layers of fibrin. In one of the cases given below (see Plate), it will be seen that death was occasioned by the rupture of a very small aneurism in the substance of the pons varolii. This was found by hardening the brain-substance in spirit before removing the coagulum.

We are indebted to Dr. Brinton for a table of fifty-one cases<sup>1</sup> of intracranial aneurism, from which it appears that the most frequent seat of the disease is the basilar artery, and next the middle cerebral of either side. If to the cases in Dr. Brinton's table be added eleven others, four from the seventh volume of the 'Pathological Transactions,' and seven referred to in this paper, the results are as follows :

*Seat of sixty-two cases of intracranial aneurism.*

|                         |  |    |
|-------------------------|--|----|
| Vertebrals and branches | Vertebrals . . . . .                         | 4  |
|                         | Basilar . . . . .                            | 20 |
|                         | Small vessel in substance of pons . . . . .  | 1  |
|                         | Posterior cerebral . . . . .                 | 3  |
|                         |  | —  |
|                         |  | 28 |
| Carotids and branches   | Internal carotids by sella turcica . . . . . | 8  |
|                         | Middle cerebral . . . . .                    | 15 |
|                         | Anterior cerebral . . . . .                  | 6  |
|                         | Anterior communicating . . . . .             | 1  |
|                         | Posterior communicating . . . . .            | 4  |
|                         |  | —  |
|                         |  | 34 |

<sup>1</sup> 'Transactions of Pathological Society,' vol. iii, p. 49. Note that in the table there are fifty-two cases, but No. 34 is omitted as not belonging to the category. (See Appendix to this paper.)

Of 58 of these cases, where the sex is given, 35 were males, and 23 females.

Men, it is well known, are more liable to all forms of aneurism than women, but there is great difference in the liability of the two sexes in respect to aneurism in different parts. Thus, in 137 cases of popliteal aneurism,<sup>1</sup> 133 were males, and only 4 females, or 33 to 1. Of 66 cases of aneurism of the femoral artery, 61 were males, 5 females, or 12 to 1. The difference lessens as we come to the aorta, where, of 167 cases of aneurism of the thoracic aorta, 132 were males, 35 females, or nearly 4 to 1. In carotid aneurism the liability of the two sexes appears to be nearly equal, for, of 25 cases, 13 were males, 12 females.

Fifty-eight cases, where the age is given, are distributed as follows:

|                |   |   |   |   |   |   |   |   |    |
|----------------|---|---|---|---|---|---|---|---|----|
| Under 25 years | . | . | . | . | . | . | . | . | 12 |
| 25 to 40       | „ | . | . | . | . | . | . | . | 13 |
| 40 to 60       | „ | . | . | . | . | . | . | . | 29 |
| Over 60        | „ | . | . | . | . | . | . | . | 4  |
|                |   |   |   |   |   |   |   |   | —  |
|                |   |   |   |   |   |   |   |   | 58 |

The relative importance of the disease at different ages is not, however, correctly expressed by these numbers, since in the later periods of life aneurism is not unfrequently found associated with more or less extensive disease of the cerebral vessels to which the symptoms and fatal results may be owing, the aneurism being an accidental and not important concomitant. In a case recorded by Dr. Bright, (No. 5 in Dr. Brinton's table,) in No. 25 of the same table, in Mr. Squire's case,<sup>2</sup> and also in one given below, the aneurismal dilatation of the middle cerebral, as it lay in the fissure of Sylvius, was unimportant, and in no way concerned in the fatal result, which was due in all these cases to atheromatous disease of the vessels generally, producing softening and effusion of blood. It is not so, however, in younger subjects. In them aneurism commonly occurs without disease of the vessels generally, and is fatal either from rupture of the sac or from

<sup>1</sup> Crisp on 'Diseases of the Blood-vessels,' pp. 134, 224, 225.

<sup>2</sup> See Table, Case 56.

pressure or softening around it. Of 20 cases occurring under thirty-five years of age, 16 were fatal by rupture of the sac; whilst of 37 cases over thirty-five, only 14 were fatal from rupture of the sac, or in other words, four cases out of five under thirty-five years of age were fatal directly from changes in the sac, but only two out of five over that age.

The youngest recorded age at which aneurism within the cranium has been fatal, is fourteen years.

Aneurism of the intracranial arteries may exist as a general dilatation of the whole vessel for a more or less limited space. Mr. Hodgson<sup>1</sup> remarks, that the internal carotid not unfrequently exhibits this form of dilatation of its entire calibre immediately it enters the skull, and he also refers to a case where the vertebral arteries were in this way enlarged into two flask-like dilatations immediately before their junction to form the basilar. I am indebted to Dr. Brinton for the notes of a similar case, which occurred in the Royal Infirmary in Edinburgh. The patient, aged thirty-eight, was admitted with paralysis of both sides of the body, loss of speech and hearing, and yet seemingly conscious. On a post-mortem examination the basilar presented a fusiform dilatation the size of a goose-quill, which had produced softening of the pons to some depth.

The aneurism may be a simple pouch of all the coats, the pouched portion being as transparent and normal in appearance as the rest of the vessel, giving the impression that it might have been some original deformity. Usually intracranial aneurism is of this form, or, as surgeons term it, true aneurism, the walls of the aneurism subsequently undergoing gradual changes, partly from continued dilatation from within, partly from chronic inflammatory changes in the parts around, set up by the presence of the aneurism. There are four conditions under which aneurism of the intracranial arteries may exist: the sac may be a simple varicose dilatation, undergoing no further change, and not affecting the parts around; or it may slowly become obliterated by fibrinous coagula, and the continuity of the vessel be restored (such a case is recorded by Mr. Hodgson, in illustration of the cure of aneurism); or the sac may undergo slow distension, and at length rupture; or,

<sup>1</sup> Hodgson on 'Diseases of Arteries,' p. 76.

lastly, it may act as a foreign body on the adjacent tissues, and set up inflammatory changes, or produce death by pressure.

The conditions of the arterial supply to the brain are plainly such as reduce the pressure on the arteries which lie within the cranium to the lowest degree, and hence the tenuity of their coats. This tenuity renders them liable to aneurismal dilatation, from causes sometimes difficult to appreciate, but at others distinctly associated with mechanical injury to the cranium, or to violent muscular efforts. When we consider that this form of aneurism occurs in young persons, whose vessels are otherwise healthy, and that the most frequent seat of the dilatation is in those vessels which lie in contact with the bones at the base of the cranium, there is yet further probability that mechanical causes, acting locally, have much to do with the origin of disease.

There do not appear to be in the nature of the case any symptoms, or order of symptoms, upon which a diagnosis of cerebral aneurism can be made. The liability of the cerebral vessels to this lesion must, however, always enter into our calculations in the general diagnosis of tumours, especially when there is evidence of local pressure on parts about the base of the brain. From the frequency of basilar aneurism this would be most frequent on the pons varolii, since there the conditions for pressure are most favorable. Symptoms may therefore, in such a case, begin from the earliest period of the formation of the aneurism, and continue for years before a fatal termination. It was so in Pfeufer's<sup>1</sup> case, where, according to the patient's account, he had for some years been subject to attacks of sudden inability to swallow. There was no regularity in the attacks, but they seemed to be induced by swallowing food hurriedly, or by exposing the neck to cold, symptoms which indicated disturbance of the medulla oblongata, as it was afterwards proved, from the formation of an aneurism on the basilar artery. Subsequently he had headache, general convulsive attacks, (ushered in by the convulsive affection of the throat,) and paraplegic weakness of the lower extremities. In another case,<sup>2</sup> sudden and absolute deafness

<sup>1</sup> 'Zeitschrift für Rationelle Medizin,' Erst Band, s. 293. (Case 9 in Synopsis.)

<sup>2</sup> 'Pathological Transactions,' vol. vii, p. 123.

was the earliest symptom of basilar aneurism, as long as four or five years before its fatal termination by rupture. The only pathological condition found was atrophy of each auditory nerve, which Dr. Van der Byl, who reports the case, thinks might have been produced by obstruction of the small branches of the basilar supplying the auditory nerves. The suggestion is important, as indicating how an aneurism may affect adjacent parts otherwise than by pressure. Deafness, as an early symptom of basilar aneurism, has been noticed in several other cases, and may have arisen from the cause here supposed, since the anatomical conditions about the sac itself did not seem sufficient to explain it. In contrast with these cases, which show how early the parts adjacent to an aneurism of the basilar may suffer, there are others where the sac has attained a much larger size without any symptoms to indicate its presence. Dr. Corfe, in his notes on the physiognomy of diseases<sup>1</sup> (Table, Case 3), relates the case of a man, about forty years of age, who was brought into the Middlesex Hospital in a state of insensibility into which he had fallen just before. The man had been working up to the time of the attack, and was apparently in the enjoyment of tolerable health. He died a few hours after admittance, and on a post-mortem examination there was found an aneurism of the basilar artery as large as an ordinary walnut, which covered the pons varolii and a portion of the medulla oblongata. The same state of things occurred in a boy, aged fourteen; an aneurism of the basilar as large as a walnut existed, without symptoms, until the system was disturbed by another cause of febrile excitement (Table, Case 4). The following table of cases of aneurism of the basilar artery exhibits a synopsis of the clinical history of the disease, and subsequently there is added a similar arrangement of clinical history of aneurism at other seats, from all which it will be confirmed that, although we may from the circumstances sometimes suspect the presence of aneurism within the cranium, we have, at the best, no symptoms upon which to ground more than a probable diagnosis.

<sup>1</sup> 'Medical Times,' vol. xvi, p. 591.

# Synopsis of Symptoms of Aneurism of the Basilar Artery.

| Case. | Age. | Sex. | Symptoms.   | Size of Aneurism.   | Authority.                                 |
|-------|------|------|---|---|--|
| 1     | 35   | Male | Gradually increasing impairment of muscular power throughout the body for two years before death. As symptoms advanced, the tongue and lips were moved with difficulty; articulation indistinct; incontinence of urine, special senses and intellect unimpaired; fatuous expression of face; conjunctiva congested; pupils dilated; death preceded by symptoms of advancing lesion of the pons; general paralysis; loss of all power to articulate; peculiar tearful expression of features; laborious and slightly stertorous breathing. | Whole length of basilar artery dilated, forming a tumour as large as a chestnut, compressing the pons varolii. The sac had not burst. | Dr. John Bright, 'Lancet,' 1828-9, p. 727. |
| 2     | 54   | Male | Headache, at times violent, yet able to continue work; great sense of weariness in limbs and sleepiness. Day preceding death was in usual health. Seized suddenly at night in sleep with sensation of being struck at the back of the neck; soon became comatose, with oppressed sobbing breathing, and paralysis of all the limbs. Partially recovered after bleeding, but died at 7 a.m. next morning.  | Aneurism size of pea on basilar artery, fatal by rupture; blood effused over medulla oblongata and into spinal canal.                 | Mr. A. Jennings, 'Lancet,' 1832-3, p. 397. |



| Case. | Age. | Sex. | Symptoms.   | Size of Aneurism.  | Authority.  |
|-------|------|------|---|--|---|
| 3     | 35   | Male | Frequent severe headache for a year; weight over ten pounds; vertigo, chills, and rigors; difficulty in describing feelings; was thought childish but continued to work as a tailor until five days before death, when he had a return of chilliness and rigors, with diplopia. After three days, paralysis of lower extremities, of right arm and right side of face, ptosis of right eye, and dilated pupil; sensation generally impaired, but chiefly on the right side; thick and indistinct articulation, as if fatuous; stupor, from which he could be roused, gradually passing into profound coma, with stertorous breathing. Death, on fifth day, from convulsion. | Small aneurism on basilar, half inch from origin; extravasation of blood at base, from rupture of sac.   | Dr. Gordon, 'Medical Times,' vol. xix, p. 381.                        |
| 4     | 40?  | Male | Sudden seizure whilst at labour in apparent health; pupils contracted; respiration difficult; inability to swallow. Death after seven hours.  | Aneurism of basilar, size of walnut; sac, containing soft coagulum, not ruptured.  | Dr. Corfe, 'Medical Times,' vol. xvi, p. 591.                         |
| 5     | 14   | Male | For two years an aneurismal tumour of right internal carotid in neck. Except being unusually flurried when reproved, he ailed nothing; was strong, industrious, and intelligent, until sudden onset of fatal symptoms from cantharides, which produced purging, vomiting, and suppression of urine. Death on evening of second day, preceded by paralysis of right side, indistinct articulation, dysphagia, and laryngeal obstruction.   | Aneurism of basilar artery, size of walnut; sac full of coagulum, not ruptured; large aneurism of internal carotid near its origin; other vessels healthy. | Dr. Kingston, 'Edinburgh Med. and Surg. Journ.,' vol. lvi, p. 69.     |
| 6     | 47   | Male | Ill fourteen months. Entire hemiplegia of the left side, both of motion and sensation; the latter so complete, that an ignited body in contact with the skin is not felt; ptosis of left upper eyelid. Articulation and deglutition   | Aneurism of basilar, size of pigeon's egg. Sac contained firm coagulum. Extravasation of blood from sac into softened substance of pons. Large effusion of | W. Ruschenberger, 'American Journal of Med. Scien.,' vol. xii, p. 65. |

|   |    |      |  |  |  |
|---|----|------|--|--|--|
| 7 | 58 | Male | <p>difficult. When sitting, needs support. Constant involuntary vibration to and fro of head and trunk and right foot. Right hand tremulous when used. Evacuations involuntary. Appetite voracious. Intellect unimpaired, but dull. When spoken to, expression cheerful. Occasional suicidal impulse. Mode of death not given.</p> <p>For nine months severe headache, not of a lancinating character, from occiput to frontal region, followed by paralysis of seventh nerve. A fortnight before death, during night, hemiplegia of left side, loss of speech, difficult deglutition. Intellect unimpaired. Died suddenly, whilst listening to a risible story.</p> <p>Long subject to indescribable sense of weight in head. Death from apoplexy following violent mental emotion.</p> | <p>limpid serum into meshes of pia mater and lateral ventricles.</p> <p>Large effusion of serum into lateral ventricles. Aneurism of basilar near its division size of bean, comprising portion of dextra. Effusion of blood from rupture of sac.</p> <p>Aneurism of basilar, near its division, size of pullet's egg. Large effusion of blood from rupture of sac.</p> <p>Effusion of serum under arachnoid and into ventricles. Aneurism of basilar size of pea. Old and recent extravasation of blood from rupture of sac. Arteries generally atheromatous.</p> | <p>Dr. Lager, 'Archiv. de Médecin,' vol. xii, p. 482.</p> <p>M. Serres, 'Archiv. Générales de Médecine,' vol. x, p. 421.</p> <p>Pfeuffer, Henle and Pfeuffer's 'Zeitschrift,' vol. i, p. 29.</p> |
| 8 | 59 | Male | <p>For some years sudden attacks of spasm of the throat, apparently brought on by hurry in swallowing food, or by cold externally. Splitting headache. Constipation. Three weeks before death vertigo and sudden insensibility, with stertor. Eyes open and fixed. Faeces passed involuntarily. On recovering consciousness partial paralysis of lower extremities, which are slightly flexed, and painful when extended. Another similar attack two days after, beginning with more severe spasm of throat. Continued tinnitus. Speech indistinct. Two other attacks, with more or less complete insensibility. Death sudden. After suddenly crying out "I am falling," he became insensible, and died in two minutes.</p>  |  |  |
| 9 | 41 | Male |  |  |  |

| Case. | Age. | Sex.   | Symptoms.  | Size of Aneurism.   | Authority.   |
|-------|------|--------|--|---|--|
| 10    | 20   | Female | Dulness of apprehension. Deafness and tinnitus aurium. Undefined headache. A week before death excruciating headache; indistinctness of vision; pupil natural; vomiting and diarrhoea. Only slight disturbance of intellect. Death in an apoplectic stupor.  | Aneurism, near division of basilar, size of bean. Extravasation into ventricles and about base of brain, from rupture of sac.                           | Hodgson, 'Diseased Arteries,' p. 76.               |
| 11    | 53   | Female | Sudden and total deafness. General health unimpaired. After three years three seizures within two months, with loss of consciousness, stertor, and hemiplegia of left side. Able to walk, with assistance, after the attacks. Gradual loss of power for two years. Bed-ridden six weeks before death. One evening uttered a sudden scream; became unconscious; breathing slow; pupils contracted. Death the following day. | Large effusion of clear fluid into lateral ventricles. Aneurism size of hazel-nut at middle of basilar. Extravasation of blood from rupture of the sac. | Dr. Van der Byl, 'Path. Trans.,' vol. vii, p. 122. |
| 12    | 34   | Male   | After more or less continued headache for six months, convulsion in sleep, followed by cerebral oppression and deafness. Slowness and feebleness of all the voluntary movements, without distinct paralysis. Three weeks after, convulsion, sudden coma, and death in three days.  | Aneurism size of large pea. Extravasation of blood from rupture of sac.   | Author.  |

The symptoms of aneurism of the basilar artery, though not diagnostic of the nature of the particular lesion, form, upon the whole, a natural group indicating its presence and its seat. It is not so, however, where the middle cerebral artery is affected, for it will be seen that in such cases there was often no clinical history previous to the rupture of the sac; or, if any, none to indicate unequivocally the presence of organic lesion. Exceptions to this there are when the sac has become large, so as to compress the central parts about the base, as in the Case 14 below. Where the arteries of the circle of Willis are the seat of the aneurism, there may also be the same vagueness in the indications of organic disease, but in two cases where the posterior communicating artery was affected, ptosis, from compression of the third nerve, was an early symptom.

As with other tumours so with intracranial aneurism, headache, though difficult to estimate strictly, is one of the most important symptoms. The one character of it which should most arrest our attention is its constant recurrence and its often distressing severity, with concomitant disturbance of the cerebral functions. All care, however, will often fail to enable us to form a correct opinion; even should we, as some have suggested, auscultate the cranium for an aneurismal murmur!

Intracranial aneurism often serves to illustrate to us how much the whole nutrition of the brain may be affected by the operation of a strictly local lesion. It may lead to subarachnoid and ventricular effusion, and produce symptoms of insanity and epilepsy. In this the brain differs from the solid viscera of the abdomen. This is probably attributable to the quality of the normal action, the morbid condition being, in popular language, attributable to a disturbance of the nervous polarity. But whatever the explanation, this fact in the clinical history of cerebral lesions explains how various may be the phases of cases which, in their general anatomical details, may be alike, the degree to which this altered molecular change occurs varying, probably, according to the original quality of the nervous substance in different individuals.

*Synopsis of Symptoms of Aneurism of Middle Cerebral Artery.*

| Case. | Age. | Sex.   | Symptoms.  | Size of Aneurism.   | Authority.   |
|-------|------|--------|--|---|--|
| 1     | 35   | Male   | No history of previous cerebral symptoms. Under treatment for hæmatemesis. Whilst walking across ward suddenly cried out from pain in the head, and fell down insensible. Breathing slow and interrupted. Death in thirty minutes.   | Large extravasation of blood from rupture of aneurism, size of a swan-shot, in branch of middle cerebral artery.  | 'Med. Gazette,' vol. xliii, p. 453.                        |
| 2     | 19   | Male   | No history of previous cerebral symptoms. Sudden exclamation, "Oh, my head," followed by insensibility. Recovery of consciousness after some hours; a gradual improvement during a week. Relapse into insensibility, and death in six hours.   | Aneurism of middle cerebral, near origin. Effusion of blood to a large extent over left hemisphere from rupture of sac.   | 'Bright's Med. Reports,' vol. ii, p. 266.                  |
| 3     | 65   | Female | Sixteen days before death sudden apoplectic seizure without premonitory symptoms. Health good at the time. Complete hemiplegia of right side and general lethargy. General improvement during a fortnight, followed by relapse into apoplectic state and death after a few hours.  | Large effusion of blood under arachnoid, over surface of left hemisphere, and breaking through into lateral ventricles, from rupture of an aneurism of middle cerebral artery. Sac imbedded in cerebral substance. Other cerebral trunks healthy.                   | 'Medico-Chir. Review,' vol. xiv, p. 234.                   |
| 4     | 21   | Female | Fifteen months before death frontal headache, gradually increasing in violence, and followed by seizure regarded as hysterical, in which there was insensibility for two hours. Recovery. After a month another similar seizure. From that time drowsiness and continued and distressing headache, loss of strength, and emaciation; appetite continuing good. At the end of a year loss of sight of right eye, with dilated pupil. Face drawn to right side when smiling. Memory defective on recent events. Died in coma, with stertorous breathing. | Four ounces of serous fluid in ventricles. Aneurism size of hen's egg, resting on right half of sella turcica, compressing anterior and middle lobes of the brain, the optic and olfactory nerves, and crus cerebri, and producing absorption of the sphenoid bone. | Dr. Hamilton Roe, 'Path. Soc. Transact.,' vol. iii, p. 46. |

|   |     |        |  |  |   |
|---|-----|--------|--|--|---|
| 5 | 50? | Male   | For some time liable to fits of short duration. Fatal seizure after full meal. Death in coma after a few hours, with contracted pupils. No stertor, spasm, or convulsion.                    | Aneurism size of walnut of middle cerebral artery, partly imbedded in the cerebral substance. Rupture of sac. Extravasation of blood into ventricles.  | Dr. J. W. Ogle, 'Path. Soc. Trans,' vol. vii, p. 127. |
| 6 | 17  | Female | Severe headache, continuing three days, followed by hemiplegia and coma. Gradual exhaustion. Sudden exacerbation of symptoms a few minutes before death, eight weeks from onset of symptoms. | Aneurism of left middle cerebral artery in the anterior part of left middle lobe of cerebrum. Softening around the sac. Laceration of corpus striatum and thalamus opticus by large effusion of blood, from bursting of the sac. Lateral ventricles full of blood. | Author.   |

*Case of Aneurism of Anterior Cerebral Artery, in substance of Hemisphere.*

| Age. | Sex. | Symptoms.   | Size of Aneurism.  | Authority.                                 |
|------|------|---|--|--|
| 14   | Male | Whilst carrying heavy weight was seized with giddiness, and became insensible for ten minutes. On recovery, had feeling of weight in the head, continued vertigo, and intolerance of light. After seventeen days suddenly fell, and became comatose; breathing stertorous; pupils dilated; paralysis of left side. Died on the fifth day. | Two aneurisms, one size of pea, other of horse-bean, on anterior cerebral artery, in substance of hemisphere. Rupture of larger sac and effusion of blood, breaking into right lateral ventricle and through septum lucidum into left. Smaller sac full of laminated fibrin. | Dr. Crisp, 'Diseases of Arteries,' p. 165. |

*Synopsis of Symptoms of Aneurism of the Arteries of the Circle of Willis.*

| Case. | Age. | Sex.   | Symptoms.   | Size of Aneurism.   | Authority.  |
|-------|------|--------|---|---|---|
| 1     | 62   | Female | No symptoms from the presence of the aneurism. Patient retired to bed in usual health. Sudden seizure in the morning on rising; semi-convulsions, passing rapidly into coma. Death in less than an hour.  | Aneurism size of filbert, arising from junction of posterior communicating and carotid arteries. Sac ruptured. Hemorrhage into ventricles and about base.   | Dr. Francis, 'Med. Gaz.,' vol. xxxviii, p. 213.       |
| 2     | 54   | Male   | Insane for three years. Occasional paroxysms of violent excitement. Six months before death epileptiform seizures. Impairment of hearing. No paralysis. Sudden prostration, with slow but not stertorous breathing. Semi-coma.  | Brain small. Multilocular aneurism, size of small apple, on posterior communicating artery, occupying floor of third ventricle, destroying the tuber cinereum, the origin of the optic and the olfactory on the same side. Optic nerve of opposite side flattened and softened. | Mr. R. Smith, 'Dublin Journal,' vol. xxv, p. 507.     |
| 3     | 18   | Female | Severe headache and symptoms of acute mania two years before death. Recovery after several months, but continued severe and "heavy" pains in the head, with occasional vomiting. Ptosis of left eyelid, gradually increasing for a week; globe on same side abducted and fixed outwards; pupil large. Shooting pain in left temple, relieved by pressure. Sudden seizure, without convulsion. Coma. Death in ten minutes. | Effusion of blood under arachnoid from optic commissure backwards over pons varolii and medulla oblongata. Clot in fourth ventricle. Aneurism on left posterior communicating artery size of filbert. Rupture of sac.   | Dr. Hare, 'London Journal of Medicine,' 1850, p. 824. |

|   |    |        |   |   |   |
|---|----|--------|---|---|---|
| 4 | 30 | Male   | Working, in apparent health, and drinking freely. Sudden pain in head, presently followed by coma, difficult and stertorous breathing, foaming at mouth. Contracted fixed pupils. Arms extended, and at times slightly convulsed. Death, in continued coma, after four or five hours.   | Effusion of blood over surface of brain and into third and fourth ventricles, from rupture of aneurism on right anterior cerebral artery. The under part of right hemisphere and floor of third ventricle torn by the effusion. | J. King, 'Med. Quarterly Review,' 1834, 1835, p. 434. |
| 5 | 20 | Female | Headache and vertigo, three weeks. Sudden pain over right eye; faintness and vomiting. Next day ptosis of right eyelid, and impaired vision on same side; eye abducted; pupil dilated. No attendant pain and vertigo. After another three weeks found in bed in the morning insensible; breathing stertorous. Died in four hours. | Aneurism size of pea, on posterior communicating artery, containing solid fibrinous coagulum. This had compressed and flattened third nerve. Recent hæmorrhage from rupture of sac.   | Mr. France, 'Guy's Hospital Reports,' vol. iv, p. 46. |
| 6 | 35 | Male   | For five years, at intervals, headache, vertigo, and tinnitus. Headache sometimes severe, commonly referred to the occiput. Sudden seizure, with vomiting and convulsions, soon passing into profound coma. Death in eight hours.   | Surface of brain deluged with blood effused under the arachnoid from rupture of aneurism on anterior cerebral artery of left side. Floor of third ventricle lacerated. Ventricles full of blood.                                | Author.   |



**CASE I.**—*After more or less continued headache for six months, a convulsion in sleep, followed by cerebral oppression and deafness; slowness and feebleness of all the voluntary movements, without distinct paralysis; about three weeks after seizure sudden coma and death in three days; aneurism of the basilar artery; superficial softening of pons varolii; effusion of blood from rupture of the sac.*

Hugh B—, æt. 34, a large, tall, heavy-looking man, with a syphilitic blotch on the upper lip, was admitted under my care into Guy's Hospital, December 24th, 1855. In 1853 he had a severe blow on the back of the head when drunk, and was laid up for a fortnight. After this he frequently vomited in the morning, which was at the time attributed to his drunken habits. In the summer of 1855 he began to complain of headache, but continued working in his usual health until a fortnight before his admission into the hospital. At this time he had a convulsion in his sleep, and remained insensible for three days. On recovering his consciousness, the mind was dull and the memory very defective. When first visited, the following note was made of his condition: "He has an anxious oppressed look. After repeated questioning to bring him to the subject, he gives a generally correct account of himself, but his memory is obviously defective. He has pain at the back of the head and down the neck, and cannot bend the head forward with freedom. Pressure over the transverse processes on the right side of the neck, and deep down to the occipital condyle, makes him complain. When asked if he has headache, he says, slowly and with indifference, 'Yes, occasionally.' He often puts his hand to his head and exclaims, 'Oh, dear.' There is a marked degree of deafness on the right side, which dates from the seizure. There is no paralysis of the extremities, or of the muscles of expression, but all the voluntary movements are performed slowly and feebly. Urine and fæces sometimes passed involuntarily. No difficulty in deglutition. No vomiting or nausea. Pupils rather large and sluggish; the left oval and somewhat larger than the right. Sight unaffected. Pulse 60. Rhythm regular. Respiration 20, with occasional slight and ineffectual cough, as if restrained by fear of shaking the head. He was emaciated considerably since the seizure. Abdomen sunken. Constipation. Urine abundant, without deposits; not albuminous. Surface cool. Extremities cold. Mouth affected by mercury." After this report there was no important change in his symptoms until January 4th. His appetite was rather voracious. He continued to complain of pain in the back of the head and in the neck when he was moved. The whole muscular system became much enfeebled, but without distinct paralysis of any part. Early in the morning of the 4th he was found comatose, with dilated pupils, eyes in constant oscillating movement, and slight convergent strabismus. Urine and fæces passed under him. Face inexpressive. Breathing stertorous. Pulse 76. Respirations 17. Conjunctivæ injected; the right covered with muco-purulent secretion. On the 5th his state was the same. On the 6th the skin was very hot and sweating. Respirations 40; stertorous. Pulse 160. Death early on the morning of the 7th, one month from the first seizure.

*Post-mortem examination.*—Effusion of clear fluid into ventricles. At the anterior part of the basilar artery there was an aneurism the size of a small nut. The sac contained a firm clot. Around it, into the subarachnoid space, there was recently effused blood. Fibrinous coagulum continuous with that in the sac extended into the trunk of the artery in both directions. The superior cerebellar and the posterior cerebral arteries were pervious. The posterior communicating arteries were filled with recent coagulum. The substance of the pons beneath the aneurism seemed to the eye quite uninjured, but a microscopical examination detected numerous “granule-masses” in the superficial parts. The blood-vessels in all the other parts of the brain were healthy. The effusion of blood around the sac was evidently as recent as the last seizure, three days before death. The cervical spine was carefully examined; the cord, nerves, and all the other textures were healthy. The thoracic and abdominal viscera were healthy.

In this case and in Case VI there was a distinct history of injury, and in both, the arteries in the other parts beyond the aneurism were perfectly healthy. The symptoms were plainly indicative of disease at the base of the brain, and a consideration of the whole clinical history of basilar aneurism should in a similar case suggest the probable nature of the lesion. The inflammatory changes around the sac were slowly bringing matters to a fatal issue, apart from rupture of it, but as they advanced the sac received less support from the softened nerve-substance, and hæmorrhage kindly cut the thread of life.

**CASE II.**—*Aneurism in the substance of the pons varolii; ingravescient apoplexy; death in three hours and a half. See Plate.*

Mrs. W—, æt. 43, wife of a publican, complained for about a fortnight before her death of dyspepsia, flatulence, and headache, which she described as at times “quite overpowering.” At 7 p.m., February 26th, 1858, she was assisting at the bar, when suddenly she cried out, “Oh, my head—I’m dying!” and fell backwards. She never spoke afterwards, but was partially conscious for two hours, being able to open her mouth when told to do so, and to move the left leg and arm. When visited at half past 9 p.m., she was perfectly comatose; lay supine, with the limbs extended and flaccid. The jaw fallen. The pupils minutely contracted and immoveable. Breathing

greatly embarrassed from paralysis of the larynx. Respirations 36, stertorous, and with an expiratory moan. Walls of chest scarcely moving during inspiration, the larynx at the same time descending, and the supra-clavicular spaces being depressed; now and then a fuller sighing inspiration. Pulse varying from 70 to 90 in the minute; irregular in force and rhythm. Carotids throbbing. Face pale. Muscles of deglutition and tongue quite paralysed. Occasional ineffectual efforts to vomit, with the expulsion of a little mucus. There had been no involuntary evacuation of the rectum or bladder. Urine drawn off by the catheter pale, and containing a small quantity of albumen. Death the same evening, three hours and a half from the seizure.

*Post-mortem examination.*—Arcus senilis well marked. A large quantity of subcutaneous fat on the abdomen. Heart normal in size and structure. Kidneys under the average size; their surface, granular, and tunics adherent. Arachnoid of the surface of the brain granular and opalescent, with several drachms of clear fluid in the meshes of the pia mater. Lateral ventricles healthy. In the lower third of the pons varolii, in the middle line, a recent coagulum, weighing two drachms. On removing this, a pyriform aneurism, having much the appearance and size of a withered grain of wheat, was seen projecting from the floor of the cavity produced by the effusion of blood. The blood had escaped from a longitudinal slit in the sac. The brain-substance around the coagulum presented no evidence of softening preceding the effusion of blood. The basilar artery was mottled throughout by opaque fatty deposits.

The seat and minute size of the aneurism in this case are the chief points of interest in it. It presents in other particulars the ordinary history of apoplexy of the pons varolii. It is a question raised by this case how far atheromatous changes in the larger arteries may throw the ventricular impulse upon the smaller vessels of the brain, and lead to aneurismal dilatation of them. The flatulence and dyspepsia which for a fortnight preceded the apoplectic seizure may have been premonitory of it. The more decided disturbance of the stomach in nausea and vomiting is notoriously often referable to the brain, and there is reason to believe that the pneumogastric nerves are frequently the channels through which early symptoms of impending apoplexy exhibit themselves.

**CASE III.**—*Severe headache, continuing three days, followed by hemiplegia and coma; gradual exhaustion; sudden exacerbation of symptoms a few minutes before death, eight weeks from onset of symptoms; aneurism of left middle cerebral artery in the anterior part of left middle lobe of cerebrum; softening around the sac; laceration of corpus striatum and thalamus opticus by large effusion of blood from bursting of the sac; lateral ventricles full of blood.*

Louisa B—, æt. 17, a fair, delicate girl, employed as a domestic servant, enjoyed good health until two months before her death. About this period she became the subject of rheumatism from exposure to cold and damp. Her rheumatic symptoms amounted only to slight swelling of the right knee and wandering pains in the limbs; she was still able to continue her work. January 1st, 1858, she complained of headache, which was unusually severe on the 3d, and in the afternoon of that day, whilst talking to a friend, she suddenly lost the power of speech, and became paralysed on the right side. There was no reliable account of her condition from this date until the 15th, when she was admitted into Guy's Hospital, under the care of my colleague, Dr. Owen Rees. Her skin was then hot and dry. She lay comatose, with the right side paralysed. Pupils dilated. Urine and fæces passed unconsciously. Bed-sore over sacrum. Heart's action sharp. Pulse 110. During ten days after her admission there was no important change except increased exhaustion. She frequently moved the left hand to her head, as if in pain. On the 25th the pulse was not perceptible at the wrist. On the 26th, at half-past 11 a.m., she suddenly gave a scream, and the face became congested. Death after a few minutes, without convulsions.

*Post-mortem examination.*—In the substance of the middle lobe of the cerebrum on the left side, and on the principal division of the middle meningeal artery, there was an aneurism of the size of a small nut, surrounded by a large recent coagulum and softened brain-tissue. Part of the coagulum consisted of fibrin which had separated from the effused blood, as in the formation of the buffy coat. The anterior third of the corpus striatum and the principal part of the thalamus opticus was broken up by the effusion, which had also filled the lateral ventricles and surrounded the crura cerebri and medulla oblongata. The arteries were healthy; weight of heart, nine ounces. Valves healthy, with the exception of some granulations on



the mitral. Spleen large, full of blood, and containing several white fibrinous masses; a section of one of the largest of these presented numerous points of softening. Kidneys large, with similar fibrinous masses (embolic), with blood effused around them. The outer coat of the aneurism consisted of a very thin layer of areolar tissue, the thicker part of the sac of laminated toughish fibrin.

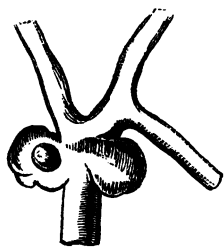
*Remarks.*—The previous occurrence of rheumatism, with signs of endocarditis, led at first to the opinion that the hemiplegia might be owing to emboli obstructing one of the cerebral vessels. This was apparently confirmed at the post-mortem examination by the fibrinous exudations in the liver and spleen, and it was only after careful search that the aneurismal sac was discovered in the midst of the softened tissue and clot. The effusion of blood had evidently taken place at the time of the last and fatal seizure. There was no trace of any old coagulum, so that we must refer the sudden hemiplegia to ramollissement only, around the sac. These changes were gradually inducing exhaustion when, as usual, the sac ruptured and cut short the case by profuse hæmorrhage. What determined the presence and seat of the aneurism could not be conjectured. The arteries elsewhere were entirely free from disease, and so was the trunk of the vessel in which the aneurism was seated.

*CASE IV.—Ingravescent apoplexy from rupture of an aneurism on middle cerebral artery of left side; death on the sixth day.*

Fanny S—, æt. 30, of middle stature, dark complexion, of rather emaciated and cachectic aspect, was admitted into Guy's Hospital on the 5th of November, 1850. The account given was, that she was cook in a family, and the previous evening had left home in perfect health, accompanied by a female friend. Whilst walking she suddenly called out, "Oh, my head!" and put up her left hand. She vomited, and, as her friend thought, fainted. After a brief interval she partially recovered, and was able to walk back to her residence with the support of two men. By the time she reached home she had recovered her consciousness sufficiently to ask her friend to conceal the fact of her having left the house. She took some tea and walked upstairs to bed, and was left, as it was supposed, asleep, but in reality in a state of gradually increasing coma. When admitted into the hospital at noon the following day, only a slight impression could be made by any attempt to rouse her. The right arm was quite paralysed, the muscles flaccid; the right leg in the same condition, with only slight traces of excito-motor action when the sole of the foot was tickled.

Features inexpressive. Both pupils contracted. Respirations 32, tranquil. Pulse 70. Heart's action sharp, without any abnormal murmur. Urine drawn off by the catheter free from albumen. In the evening the left pupil had dilated, and was immovable on the stimulus of light; the right remained contracted. The left eyelid was slightly fallen. The patient turned herself over in bed in a restless manner, and frequently put the left hand to her head. Face flushed and inexpressive. Respirations 24. Pulse 60. November 6th, the breathing stertorous. Pupils variable, and one time contracted, at another dilated, without any external cause. Deglutition difficult; urine and fæces passed unconsciously. On the 8th she appeared more sensible, ate some bread and butter, and when spoken to made an attempt to answer, but was unable to articulate. The head was rolled from side to side and the left hand lifted to it, as if in pain. On the 9th the catamenia appeared rather profusely, and she so far rallied as to recognise a relative who visited her, and to say distinctly, "My cousin." On the evening of the 10th her symptoms became aggravated, the face flushed, the eyes suffused, pupils dilated and fixed. Respirations 26, with an occasional prolonged expiratory effort. Pulse 72. Twitching of left side of face. Death a few minutes after this report.

*Post-mortem examination.*—On removing the membranes of the brain the anterior convolutions of both hemispheres were evidently flattened. Under the arachnoid, on the left side, there was extravasation of blood, filling the sulci between the convolutions and blocking up the fissure of Sylvius. On making a section through the centrum ovale majus, the substance of the left hemisphere, external to the corpus striatum and thalamus opticus, was found softened to a great extent, and in the midst of this softened portion recent coagula and bloody serum. The effusion had not extended into the ventricles. The middle cerebral artery, on the left side, had upon it two small aneurisms. One of these had ruptured by a circular opening and given rise to the hæmorrhage. The descending cornu of the left lateral ventricle contained bloody serum, and the tissue was softened in many spots. Heart small, covered with fat; muscles soft and greasy. Some thickening of the mitral valve. Kidneys and other viscera healthy.



*Remarks.*—The length of time from the rupture of the sac to the fatal termination was explained by the state of parts after death, for the hæmorrhage, though extensive, had not broken in upon the central parts, but was spread out under the

arachnoid. The remission of the symptoms on the fifth and sixth days was remarkable, and may have been due to changes in the clot, the pressure on the surrounding parts becoming equalised by its contraction and by absorption of the serum which had diffused itself through the softened tissue.

**CASE V.**—*Ingravescent apoplexy; convulsions; atheroma of cerebral vessels; very large effusion of blood into right hemisphere; aneurism of middle cerebral artery on left side as it lay in the fissure of Sylvius.*

Mr. P—, æt. 58, of intemperate habits, and recently the subject of delirium tremens, whilst reading on Sunday evening, February 28th, 1859, dropped his book from the left hand, and his speech became indistinct. There was no exclamation. After an hour a violent convulsion came on, affecting the right side only. Convulsions returned four times at the interval of an hour or so, always limited to the right side, the left being slightly flexed and rigid. When the convulsions ceased he was able to answer questions, though slowly and indistinctly, and pointed to the right temple as the seat of pain. When visited five hours from the commencement of the seizure he was lying supine in a state of semi-coma, from which he could be partially roused; breathing stertorous; pupils contracted, only slightly acted on by light; optic axes divergent. Pulse 112. The following day, at one o'clock, he lay in the same state, and still pointed with his right hand to his forehead when asked if he had pain, and even muttered a few words indistinctly. The left side rather rigid and motionless. Priapism. In the evening the breathing became slower, and the coma more profound. He died forty-four hours from the beginning of the attack.

*Post-mortem examination.*—In the right hemisphere, external to the corpus striatum and thalamus opticus, and not breaking through either to the surface or into the ventricle, was a large effusion of blood, which had formed a cavity four inches in its antero-posterior extent, two inches and a half transversely, and one inch and three quarters vertically. The cerebral vessels were extensively atheromatous. In the fissure of Sylvius, on the left side, the middle cerebral artery was dilated into an aneurismal pouch the size of a large pea. The coats of the vessel forming the sac were transparent, nor was there any trace of lesion in the textures around. Its presence was a mere coincidence, and from all appearance it may have existed as an original deformity.

**CASE VI.**—*Headache at intervals for five years, sometimes severe; vertigo; tinnitus; sudden convulsive seizure, rapidly passing into coma; death in eight hours. Aneurism on anterior cerebral artery; rupture of sac; large effusion of blood over surface of brain and into the ventricles.*

Mrs. V—, aged 35, of a delicate, rather spare, and anæmic habit, had for five years been troubled at times with headache, vertigo, indistinctness of sight, a sense of thickness in the ears, with tinnitus, and occasionally a noticeable slowness in apprehending what was said to her, though the intellect was clear. There was no such distinctness in her symptoms, however, as to lead to the suspicion of any organic disease in the cranium. Her ailments seemed to be referable to more general conditions, associated with slight anæmia and constipation. About eighteen months before her death she had an attack of headache, which continued for a fortnight, and prevented her leaving her room. The pain was never referred to any given spot, nor to the right or left temple; more commonly, in describing it, she put her hand to the occiput. Catamenia normal. My friend, Mr. John Burton, of Blackheath, whose patient this lady was for a few months preceding the fatal seizure, informed me that her principal symptoms were vertigo, stuffing and ringing in the ears, a sense of general weakness, and constipation, and that she was apparently relieved by the use of iron and aloes, and by syringing the ears. The day before the fatal attack she was in her garden planting seeds, and was more cheerful than usual. At noon the next day she was taken with vomiting, and soon after fell into convulsions. At two p.m. the convulsions had ceased. She lay in profound coma, with the right arm flexed and rigid, and the right pupil dilated; the left side was flaccid and motionless, the left pupil contracted. Towards death both pupils became dilated and the trunk universally paralysed. Death at 9 p.m., eight hours from the beginning of the attack. It only subsequently transpired that this lady had had a fall from her horse a few weeks before her symptoms began.

*Post-mortem examination.*—The brain, both on the surface and in the ventricles, was inundated with blood, which had escaped from a rent in an aneurism of the anterior cerebral artery of the left side. The aneurism extended over to the right side, lying over the optic nerves. The sac at its distal part, on the right side, was formed by coagulated fibrin, and by the under surface of the inner angle of the anterior lobe of the cerebrum. The rupture had so occurred as to lacerate that portion of the brain which formed the floor of the third ventricle. The ventricles were full of blood, and the subarachnoid tissue infiltrated over the whole surface, but principally about the base and between the hemispheres. The brain-substance was nowhere destroyed but at the part indicated. The cerebral

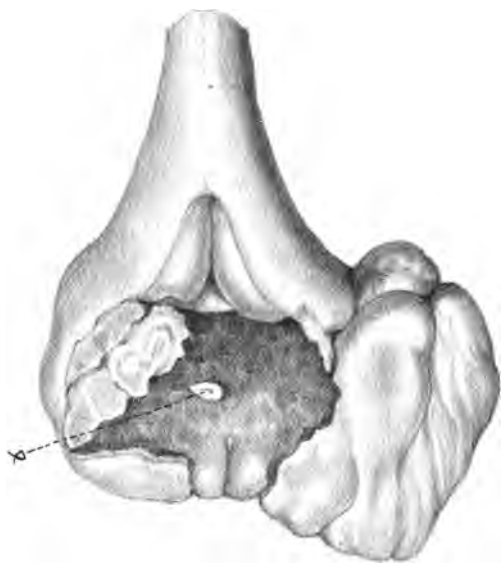


vessels were generally healthy. No spots of atheroma. The principal part of the sac of the aneurism was transparent, and formed of the normal coats of the vessel distended, but at its distal part, under the right hemisphere, the coats had given way, and the sac was formed, as described above, of a thin layer of fibrin and of the brain-tissue adjacent. The direction of the aneurismal dilatation was upwards and to the right side, in the course of the arterial current, and thus the optic nerves escaped pressure. The line of rupture also lay in the direction of the arterial current, namely, forwards and upwards, the effused blood tearing the floor of the third ventricle, and distending the meshes of the pia mater. The aneurism had been evidently for a long period of its existence what is called a true aneurism.

*Remarks.*—There was one symptom in this case which indicated more than others some organic disease about the brain—the occasional noticeable slowness in apprehending what was said. Slight as it seems to have been, it was in its character of the highest importance. In what way a local cause like aneurism should so affect the whole cerebrum is not to be explained until we know more of the nerve-force; but, as remarked above, we may suppose a local lesion capable of altering the polarity of the adjacent nerve-tissue and the condition of the rest.

## PLATE

To illustrate Dr. Gull's cases of aneurism of the cerebral vessels. A small aneurism on the floor of a cavity in the pons varolii formed by effusion of blood from a slit in the sac is seen at *a*.



*Day & Son, Lithrs to The Queen.*

*W. Hurst.*



ON  
RETROVERSION OF THE AORTIC VALVES  
FROM  
DISEASE IN THE SINUSES OF VALSALVA.

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By WILLIAM GULL, M.D.

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PHYSIOLOGISTS have explained the action of the sinuses of Valsalva for adapting the aortic valves to prevent regurgitation during the diastole of the ventricle. They have shown that during the ventricular systole, the sinuses, on account of their thinness, are much dilated, and thus the valves made tense; that as the ventricular systole ends, the recoil of the sinuses adjusts the valves for the support of the arterial column. How perfectly this mechanism fulfils its function is proved by the clearness of the second sound of the heart during life, and by the thinness and definition of the surfaces of contact after death. The simplicity and the perfection are wonderful.

The object of these remarks is to draw attention to an accident to which there is a liability when the sinuses become rigid from atheromatous changes. Under such circumstances the sinuses may fail to throw the valves inwards towards the centre of the vessel, and these so deprived of that mutual support which they have when the recoil is normal may be exposed to the danger of retroversion. Dr. Hodgkin, and subsequently Dr. Chevers, referred to many of the conditions which produce retroversion of the aortic valves, but neither has noticed the direct influence of the want of elasticity in the sinuses here alluded to. The following case, admitted under the care of my late colleague Dr. Hughes, affords a good illustration of such an accident.

*Sudden dyspnœa and palpitation; orthopnœa; dropsy; death after fifteen weeks. Atheroma of the sinuses of Valsalva; retroversion of one of the aortic valves; great dilation of left ventricle.*

John H—, æt. 39, a day labourer in the docks. Always had good health until ten weeks before admission into Guy's Hospital. His symptoms—breathlessness, orthopnœa, palpitation, and cough—came on suddenly. He never had rheumatism. The distress of breathing continued, and was attended with so much pain across the chest, that an aneurism of the aorta was suspected. The pain was, however, probably attributable to sudden and continued distension of the left ventricle. The stethoscopic symptoms were only those of aortic regurgitation. He remained unrelieved, and died after being five weeks in the hospital.

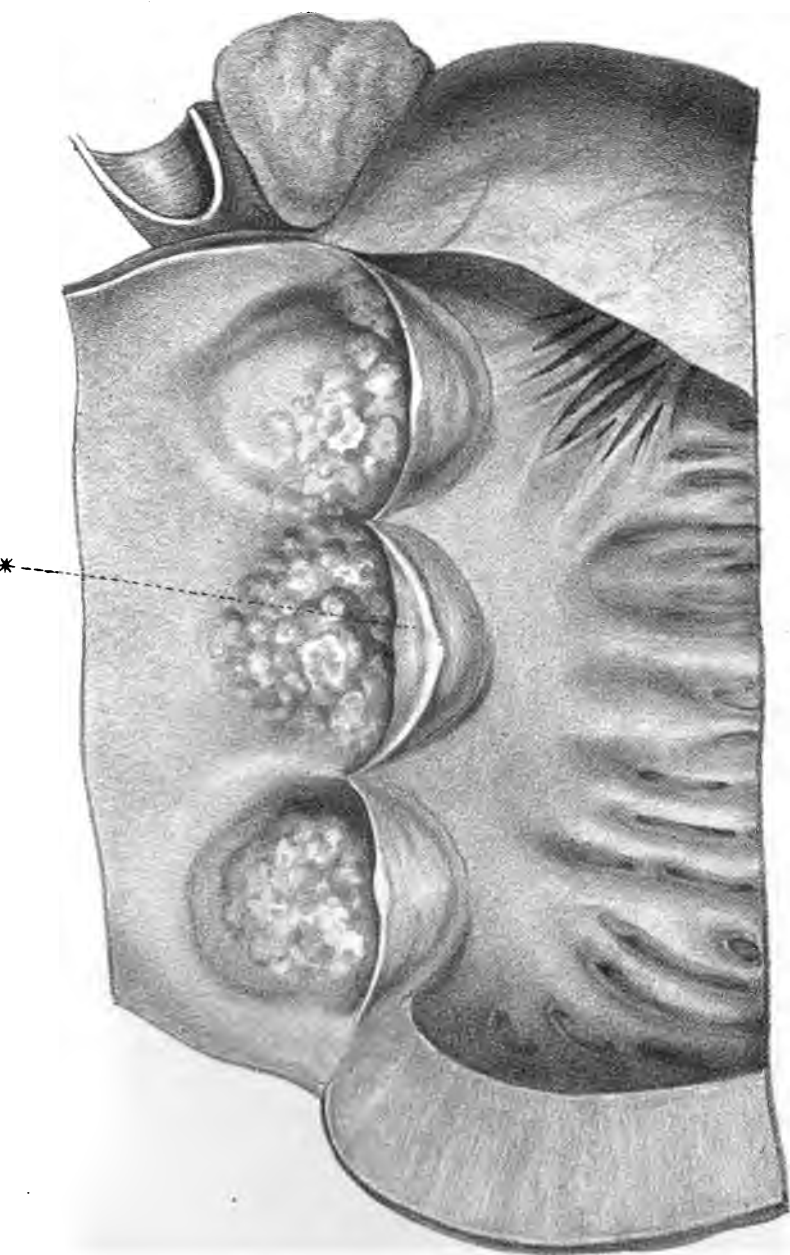
*Post-mortem examination by Dr. WILKS.*—Masses of apoplectic effusion in both lungs, but principally in the right. Great dilatation of the left ventricle, with only moderate hypertrophy, the form of the ventricle being remarkably globular from transverse distension. The bulging of the posterior wall of the ventricle behind the mitral curtain was also very remarkable. The muscular columns supporting the chordæ tendinæ of the mitral were much elongated, but not hypertrophied. The sinuses of Valsalva were extremely atheromatous. This was especially the case with two of the sinuses. The aortic valve corresponding to one of these was retroverted. Except this apparently accidental folding over of the valve, the valves were healthy. The aorta above the sinuses was free from atheroma, and healthy. Kidneys and other abdominal viscera healthy.

## PLATE

*To illustrate Dr. GULL's case of Retroversion of Aortic Valve.*

Two of the sinuses of Valsalva extremely atheromatous, the third less so. Valves healthy, one (\*) retroverted.

The outline of a part of the ventricle exhibits the amount of dilatation of the cavity from regurgitation.



*Day & Son. Luth. to the Queen.*

*W. Hurst.*



ON  
DESTRUCTIVE CHANGES IN THE LUNG  
FROM  
DISEASES IN THE MEDIASTINUM  
INVADING OR COMPRESSING THE  
PNEUMOGASTRIC NERVES AND PULMONARY PLEXUS.

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BY WILLIAM GULL, M.D.

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PHYSIOLOGISTS have proved by experiments on animals that, after division of *both* pneumogastric nerves, the lungs undergo destructive changes.

The first effect of the operation is a lowering of the frequency of the respirations. After a few hours the pulmonary tissue becomes congested, and then follows effusion of serum into the air-cells and bronchial tubes. At this stage most of the animals experimented upon die, but in such as survive, œdema of the tissue is followed by purulent infiltration (red and gray hepatization) and often by gangrene.

These are the effects of division of *both* pneumogastric nerves. If only *one* is divided, the damage to the lungs is not so certain. Reid, who very fully investigated this subject, reports that he removed a portion of the *par vagum* in fourteen animals, and never observed any morbid structural change that could be attributed to the section of the nerve. None of these animals appeared to suffer any bad consequences. The dogs breathed easily, and ate and digested as before; the rabbits also were as lively and active as ever, after the operation. No morbid



changes could be observed in the lungs of the calves and dogs after death. Three rabbits which were allowed to live a fortnight were apparently in perfect health when killed, and no structural difference could be perceived between the lungs of opposite sides. A rabbit which lived three months died of recent pneumonia affecting *both* lungs. From these experiments Reid concludes that the morbid changes described by others must have been accidental. Majendie,<sup>1</sup> it is well known, expressed an opinion contrary to that here quoted from Reid. He says—“Vous savez que dans le cas où l'on ne coupe qu'un seul nerf on trouve après quelques jours le poumon profondément altéré et réduit souvent à une masse hépatisée; si l'animal ne meurt pas, c'est que l'action d'un seul poumon est suffisante pour l'entretien de la vie.” Again, he says—“Quand on coupe un seul nerf de la huitième paire le poumon auquel appartient ce nerf devient le siège d'alterations de plus en plus graves. Son tissu s'enflamme (c'est l'expression consacrée) et bientôt il devient impropre à la respiration.” In one experiment he found the lung on the side of the divided nerve healthy, the animal having survived the operation six months. This contradictory fact he endeavours to explain by hinting that there may have been a reunion and repair of the nerve, or that the damaged tissue may by absorption have regained its normal state. Wundt,<sup>2</sup> who instituted a number of careful experiments upon the influence of division of the pneumogastric nerves upon the respiratory organs, makes no further observations on the effects of division of one nerve than that the number of respirations is lessened and their rhythm irregular. My friend and colleague Dr. Pavy, who in prosecuting his inquiry into the production of diabetes has in numerous instances divided the pneumogastric nerves, informs me that whilst pneumonia follows section of both nerves, injury of one nerve does not produce any obvious effects.<sup>3</sup>

<sup>1</sup> Majendie, ‘*Sur les phénomènes vitales*,’ pp. 203 and 224.

<sup>2</sup> Müller’s ‘*Archiv*,’ 1855.

<sup>3</sup> The following note has been kindly given me by Dr. Pavy:

“Division of one pneumogastric does not produce any sensible pulmonary disturbance. In one instance an animal was killed three weeks after the division of one nerve, and nothing unnatural in the chest was noticed on examination.

“Division of both pneumogastrics occasions great distress of breathing; and pneumonia is invariably found if the animal live long enough, which is almost con-

The free communication between the two vagi in the pulmonary plexus is the probable reason of this difference in the results between the division of one and both nerves. By it each nerve can maintain the normal integrity of the plexus, and only when both are injured will morbid effects result.

These experimental deductions are, however, only true as respects injuries of the trunks of the pneumogastrics as they lie in the neck, for it is there only that experiments on these nerves are possible. The results are different when the nerves and their plexus are injured by disease lower down at the root of the lung, because not only are there large branches from the sympathetic at that part, injury of which would have an influence upon the morbid processes, but because the branches going to either lung may be individually implicated, and consequently the corresponding lung be directly deprived of its nervous supply.

The following cases illustrate this.

*CASE I.—Aneurism of the left side of the arch of the aorta pressing upon the left pneumogastric nerve and upper part of pulmonary plexus ; sloughing pneumonia of the left lung.*

George R—, æt. 35, admitted into Guy's Hospital, under the care of my colleague Dr. Addison, March 25th, 1850, a sailor, and up to the age of 33 always enjoyed good health. At that time he had a sudden attack of paralysis of the right side, with loss of speech. He gradually recovered, but was never again able to read or write, both of which he did tolerably well before the seizure. His face was thin and haggard, expression anxious; body emaciated; voice husky; respiration hurried, and impeded by laryngeal obstruction. Breathlessness. He complained that for a month he had had an uneasy tickling sensation in the throat, causing frequent cough. There was no pain on either side of the chest. Some difficulty in deglutition, more for fluids than for solids. Skin hot and sweating. Tongue furred.

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stantly the case. The inflammation is distributed in patches over the lungs; and in forty-eight hours after the operation I have noticed the lung-tissue broken down into small purulent cavities—the pus-globules having been recognised by the microscope.

“Division of the carotid sympathetic (in the rabbit, where it is distinct from the pneumogastric) does not visibly affect the lungs.

“Division of the ascending branches of the superior thoracic ganglion of the sympathetic invariably leads to a fatal pleurisy on the side on which the operation is performed. The pleurisy is limited to the pleura parietalis, the lungs and membrane covering them presenting a perfectly natural appearance.”

Pulse 100, small and feeble. The left side of the chest was dull, on percussion, throughout. No tactile vibration. No vesicular murmur. No bronchial sounds, except near the apex, where loud bronchial breathing was audible. Except this, the whole of the left side of the chest seemed impervious to air. The right lung appeared to be abnormally resonant. Respiration puerile. Mucous râles in larger tubes. Sputa rather abundant, muco-purulent. Under the cartilage of the second rib on the left side, a soft double (aneurismal) whiz was heard. The diagnosis was aneurism of the arch of the aorta, phthisical disease of the left lung, and pleurisy. He died exhausted on the 5th of April.

*Post-mortem examination.*—Right lung healthy. Left lung irregularly consolidated; the tissue gray. In the upper lobe, irregular cavities formed by the breaking up of the tissue, and communicating with the bronchial tubes. The tubes themselves were filled with muco-purulent secretion. Some effusion into the pleura. Heart healthy. At the arch of the aorta, on the left side, there was an aneurism of the size of a large orange, which had extended downwards and backwards, and compressed the left pneumogastric nerve and the adjacent branches of the pulmonary plexus. The posterior part of the sac was formed by the bodies of the first, second, and third dorsal vertebræ. The sac itself had not burst. In the fissure of Sylvius, on the left side, and covering some of the convolutions of the island of Reil, was a tough, yellowish substance, the remains of a large clot. The gray matter beneath was partially absorbed, and the yellow substance dipped down into the corpus striatum, in which there was a spot of softening.

In this case, as in the two others I have to relate, the physical diagnosis was obscured by the state of the bronchial tubes. When the nerves of the pulmonary plexus are injured, paralysis of the tubes follows, they gradually become filled with exudation, which they cannot expel, and hence are impervious to air. Besides this, as I shall have again to notice under the third case, the chest is flattened, probably from atelectasis of the pulmonary tissue, which comes on with the paralysis of the tubes. This and the dulness on percussion and absence of respiratory movement may lead to the diagnosis of chronic pleuritic effusion undergoing absorption, when on post-mortem examination it may be found, as in the above and following cases, that there is a very different state of things, namely, obstruction of the paralysed tubes and chronic pneumonia.

**CASE II.**—*Cancer of the œsophagus invading the trunk of the right pneumogastric nerve and the branches of the pulmonary plexus behind the right bronchus; enlarged bronchial glands; ulceration of right bronchus; pneumonic consolidation and commencing gangrene of right lung.*

James R—, æt. 45, admitted into Guy's Hospital, under my care, November 21st, 1854. For some weeks he had had difficult deglutition and pain under lower third of sternum, and at the ensiform cartilage. Emaciation. Cough. Peculiarly offensive muco-purulent expectoration, streaked with blood. Dulness, on percussion, from the lower angle of the scapula to the base of the lung on the right side. Absence of respiratory sounds at the seat of dulness, mucous crepitation and bronchophony above. Puerile respiration over left side. He died on the 29th.

*Post-mortem examination.*—At the commencement of the œsophagus there was epithelial cancer, ulceration extended down as low as the root of the lungs, but neither the lungs themselves nor the pleura were invaded. The areolar tissue around the œsophagus was infiltrated by the cancer, and especially on the right side, about the right bronchus. The right pneumogastric nerve was at this part of its course implicated in the disease, so that it could not be traced to its distribution. The right lung was extensively consolidated, its lower lobe was infiltrated with a grayish or rather greenish sero-purulent fluid, having an offensive odour. The mucous membrane of the bronchi on this side was intensely congested. The tubes obstructed with muco-purulent secretion. The bronchial glands were enlarged by cancerous deposit in them. From one of these, lying on the right bronchus, the cancer had extended into the tissue of the tube.

Left lung healthy. Larynx healthy. Heart and other viscera healthy.<sup>1</sup>

*Remarks.*—It could not in this case be so unequivocally inferred, as in the preceding, that the destruction of the lung was alone due to disease of the nerves, for the cancerous affection had extended to the bronchial glands and also invaded the tissue of the bronchi. It may therefore be supposed that there was obstruction of the absorbents and of the bronchial veins, which would influence the result. Although in similar

<sup>1</sup> This case is recorded by Dr. Habershon, 'Observations on Diseases of the Alimentary Canal,' Case xx.

cases the possibility of such complications and their operation cannot be overlooked, there still remains the fact that the nerves were in this case invaded and destroyed, accompanied with those changes in the pulmonary tissue which would follow paralysis of the bronchial tubes.<sup>1</sup>

**CASE III.**—*Fibrous thickening (malignant ?) of the tissue in the mediastinum and around the right bronchus (but not narrowing or compressing it) ; implication of the right pneumogastric nerve and branches of pulmonary plexus ; consolidation and purulent infiltration and sloughing of the pulmonary tissue ; small bronchial tubes much dilated and full of muco-purulent secretion.*

Joseph J—, æt. 61, admitted into Guy's Hospital, under my care, January 12th, 1859. He was much emaciated, and had a cachectic aspect. The report he gave of himself was that he had been ill for four months, and that his symptoms began with sharp pain in the right side, without cough. On examining the chest, the right side was found entirely dull on percussion, but the natural resonance of the sternum remained. The whole side was flattened, and the infra-clavicular space depressed. On auscultation, no respiratory murmur nor any bronchial sounds were audible at any part. There was no vocal resonance nor tactile vibration. He had never spat blood. The left side was resonant on percussion throughout. Bronchial râles in the larger tubes. Expectoration muco-purulent, without odour. The diagnosis was chronic pleurisy, with effusion undergoing absorption. Malignant disease was suspected, but no enlarged glands could be found in the axilla or neck, nor were there any symptoms of pressure on the parts in the mediastinum, causing difficult respiration or deglutition. He died on the 19th.

*Post-mortem examination.*—Old and universal adhesions of right pleura. Fibrous thickening and induration (malignant ?) around the bronchus, not narrowing or compressing it, but implicating the trunk of the right pneumogastric nerve and the branches of the pulmonary plexus. The trunk of the nerve was so entirely confounded with the new tissue that it could not be traced through it. The smaller divisions of the bronchial tubes were universally dilated up to the periphery of the lung. They as well as the larger tubes were choked with muco-purulent secretion. The pulmonary tissue was consolidated

<sup>1</sup> Whilst writing these notes I was informed by my friend Dr. Wilks that Dr. Budd had lately read a paper before the Medico-Chirurgical Society, on 'Disease of the Lung from Malignant Disease in the Mediastinum.' I have not seen any notice of this.

into the state of gray and iron-gray hepatization. In the lower part of the upper lobe was a large sloughing cavity, from the breaking up of the indurated tissue. The pleura pulmonalis was thickened to the extent of the eighth of an inch in parts. The left lung was healthy. The bronchi on this side were free. Heart and abdominal viscera healthy.

*Remarks.*—This case affords an excellent illustration of the effects which are referable to paralysis of the pulmonary plexus on one side—accumulation of muco-purulent secretion in the paralysed bronchi, subsequent dilatation of the tubes at their peripheral distribution, concomitant exudation into the air-cells (hepatization), and at length disintegration of the tissue. It is also worthy of notice that the whole volume of the lung was diminished, as shown by the flattening of the chest and falling in of the infra-clavicular space. This might be partly referable to the contraction of pleuritic adhesions, but it is probable that it was chiefly caused by that atelectasis of the tissue which followed upon paralysis of the bronchi. The steps of this process have been made out on the lungs of animals after division of both pneumogastrics. It seems that the capillaries of the lung, becoming congested, encroach upon the space of the air-cells, and produce an airless and dense state of the pulmonary tissue, with reduction of volume.

The effects of division of the pneumogastric nerves have been referred by physiologists chiefly to paralysis of the bronchi, and not to the destruction of any mysterious influence which the nerves may be supposed to have in the normal state on the pulmonary tissue. Paralysis of the bronchi would include not only the loss of muscular and sensitive function as regards the tubes themselves, but also the loss of the excitor influence of the bronchial surface upon the medulla oblongata. It is to this latter cause especially that Reid attributes the morbid results. He says—“If the congested state of the blood-vessels precede, as we believe, the effusion of the frothy serum, we have next to inquire what is the cause of the retardation of the blood and congestion of the blood-vessels in the lungs. This we were formerly inclined to believe might depend upon paralysis of the muscular fibres of the bronchial tubes, but being unable to obtain any satisfactory evidence of this, we again watched the

phenomena more narrowly, and now believe that all the morbid changes observed in the lungs can be traced to diminished frequency of the respiratory muscular movements."<sup>1</sup> This theory, though apparently admissible under the conditions of division of both nerves, is plainly inadequate when the injury is limited to one. It cannot then be diminished frequency of respiration to which the effects are due, for if so, both lungs would suffer equally. And the same may be said of the theory of Fowelin, who refers the morbid changes to gradual paralysis of the heart. We must obviously look to more limited causes when, as in the cases above given, the effects are so limited. There seem to be but two ways in which the morbid changes can occur when one lung only is affected. It cannot be, as we have just said, through alteration in the respiratory rhythm, nor in any alteration in the force or frequency of the heart's action, since these causes would influence both lungs equally. It must, therefore, be either through some direct nutritive disturbance in the pulmonary tissue, as assumed by Schiff, or through paralysis of the bronchi and vessels. The former is an hypothesis which has often been put forth, but is still unsupported by proof, for we know of no way in which the nerves can influence the nutrition of a part but through some alteration of the force of the contractile elements in it or in its vessels. "In the present state of physiology," says Wundt,<sup>2</sup> "it is not possible to see more in the disturbances which follow section of the vagus than a sensitive or motor paralysis, since such are the only modes of action we know of in peripheral nerves." Paralysis of the bronchi, and of the vessels, is admitted to be a true cause for the phenomena, and is probably also a sufficient one. The bronchial tubes, under the conditions given in the cases related above, become unable to empty themselves of their contents, and the pulmonary capillaries also become equally unable to transmit blood through them. The bronchial tubes, and in a higher ratio the smaller tubes, become dilated, the pulmonary tissue congested, and exudation (hepatization, or purulent infiltration), follows. These are inflammatory changes in the strictest use of the word, though Majendie, in the quotation

<sup>1</sup> Op. cit., p. 204.<sup>2</sup> Op. cit.

given above, criticises the expression. And it is the more important to fully recognise the inflammatory nature of these changes, since we are still too apt to think of inflammation as essentially a nutritive activity, in the way of excess—as an “effort” of nature rather than as a “lapse” or paralysis of her powers.

Besides their pathology, these cases present points of interest in diagnosis. In the first case, the aneurism, by compressing the recurrent branch as well as the trunk of the pneumogastric nerve, produced both laryngeal and pulmonary symptoms; in the second case, the conditions were obscured by the absence of respiration over a considerable part of the condensed lung; and in the third, it was from this cause impossible to make a diagnosis by physical examination only. It is one of the evils of a too exclusively humoral pathology that it leads us to overlook the minute anatomical relations of disease, which are in themselves often a key to the sequence of morbid changes. These cases illustrate this proposition, for the possible local effects on the lung of injury of the pneumogastric and pulmonary plexus being recognised, whenever cause sufficient for that injury exists we may anticipate its results, and are not wholly dependent upon physical examination as we are if we limit our pathological view to the mere changes in the lung without considering how they are produced.

The chief point worthy of note in the physical diagnosis is, that when the paralysed bronchi become choked, the respiration in the part is greatly enfeebled, if not altogether absent, and hence there are no indications from the entrance of the air of the state of the pulmonary tissue. There may be dullness on percussion, absence of vocal resonance and respiratory murmur, and immobility of the chest, not because there is effusion of fluid or some cancerous or other growth, but because the bronchi are obstructed and immobile, and the tissue of the lung consolidated.



ON  
FACTITIOUS URTICARIA.

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BY WILLIAM GULL, M.D.

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WILLAN describes a form of urticaria which shows itself when the skin is rubbed. "It may," he says, "be excited on any part of the body, in a few seconds, by strong friction or scratching, but the wheals presently subside again." It is included by this author in "*urticaria evanida*," because the wheals are transient, nor does he distinguish it from ordinary chronic urticaria, with wheals arising spontaneously. It is this distinction which the term "*factitious*" is intended to mark, for the malady thus named (when it amounts to a malady) is not associated with common urticaria, the skin having its natural appearance in the cases I have seen, unless rubbed by the dress or otherwise, or stretched by the use of the muscles in violent exertion. The patients were not liable to the eruption of any wheals but such as had this mechanical origin. Any form of wheal in these cases could be determined by the direction and extent of friction on the skin, and if with a blunt point any figure or letter was traced it quickly came into relief with great sharpness of outline. In the accompanying Plate is shown the forearm of a young gentleman, where the initials of his name thus traced have so risen.

The effect is greatest where the skin is well supplied with muscular fibre-cells, and hence on the volar surface of the thumb it is scarcely produced.

This susceptibility of the skin is common, in a greater or less degree, to all persons, and can be termed morbid only when extreme. In the first patient in whom I noticed it, it was

the source of great inconvenience, for if the skin was handled roughly, as in wiping the face with a towel or in pulling on the socks, it would quickly become swollen and stiff with wheals. This susceptibility may be hereditary. It was so in the case of the gentleman who afforded his arm for the sketch. His father's skin was equally irritable. In four other cases which I have seen, this tendency in the skin came on gradually, without any assignable cause. In one only was there any recognisable disturbance of the general health, and that was in a youth of fifteen, who was liable to attacks of spasmodic asthma, which seemed to be associated with the state of the skin.

When it was found that a wheal of any shape could be made upon the healthy skin, it suggested a more minute inquiry into the nature of a wheal, and the conclusion arrived at was, that wheals are principally due to contraction of the muscular tissue of the skin. If a line be traced with slight force on a skin which is prone to this form of contraction the first noticeable change is a wrinkling of the surface, as in "*cutis anserina*." In forty seconds there is a slightly raised red line; in sixty seconds the line is palpably raised and hard; in ninety seconds there is an obvious wheal, which becomes fully developed in three minutes. If a large space be rubbed there is a sensation of tightness and stiffness, as if the part were hide-bound. If two points be marked on the skin previous to the friction, they are found nearer together after the wheal has risen. With the rising of the wheal, which is white and firm, there is an accompanying areola of capillary hyperæmia, which, after some minutes (fifteen or twenty-five), disappears, leaving the wheal for a longer time persistent.

If, as here suggested, a wheal be due to muscular contraction, we should, *à priori*, expect its formation and duration to be modified by whatever influences the activity of the involuntary muscular fibre, and such is the result of experiment. After dropping chloroform on the skin, however susceptible it might have been before, no wheal could be brought out by friction, and when chloroform was applied to a wheal already risen it quickly reduced it. When ice was applied to the part immediately after friction, a wheal did not rise. By stretching the skin the wheal could be obliterated, apparently by over-

coming the contraction of the muscular tissue. These facts are elucidated by a collateral experiment. If the stomach and intestines of a cat or dog, immediately after death, be exposed, imperfect wheals (but essentially wheals) may be formed upon them by passing a point sharply over their surface. These are plainly the result of muscular contraction.

When we consider the rapidity with which the eruption forms, its noticeable gradations through cutis anserina, the hardness and sharpness of its outline, the conditions which modify it, and the parts of the surface where it is most readily excited, and its non-occurrence on others, the conclusion above stated seems irrefragable.

How a wheal is excited in ordinary urticaria, whether directly by the circulation of some irritating substance through the cutaneous tissues, or indirectly by reflection through the vaso-motor nerves, or indifferently by both modes, is not proved. Admitting that the blood is the more common channel, there are still many clinical facts, as well as the proofs given above, which show that it is not the exclusive one. It is well known that exciting or depressing emotions will favour the eruption, and sometimes it seems to be caused by merely thinking of it. We are so much in the habit of viewing these phenomena as evidence of the elimination of a *materies morbi*, as an "effort of nature" to throw off what is offensive, that we are prone to overlook all other modes of action.

## PLATE

*To illustrate Dr. GULL's remarks on Factitious Urticaria.*

Left arm, on which two letters (initials of person's name) were marked. They have risen into bold relief, pale, and surrounded with capillary blush.



*Day & Son Lith'g The Second*



CONTRIBUTIONS  
TO  
DENTAL PATHOLOGY.

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BY S. JAMES A. SALTER, M.B., F.L.S., F.G.S.

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I. ON THE IMPACTION OF PERMANENT TEETH IN THE  
SUBSTANCE OF THE MAXILLARY BONES.

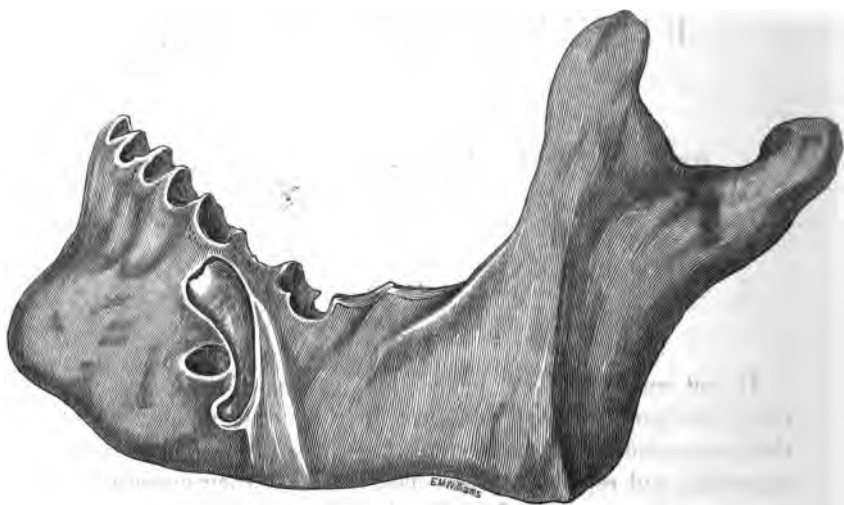
It not unfrequently happens that certain of the temporary teeth are found present and firm in the adult mouth, whilst the corresponding permanent teeth—those which should have succeeded and replaced them—have not made their appearance. This condition is most often seen in reference to the temporary molars of the lower jaw and the canines of the upper. These teeth are not infrequently retained to a very advanced period of life, and I have once seen the lower temporary molars firmly planted, and useful for mastication, in a man at the age of sixty-five. In these cases the presence of the temporary tooth is almost always associated, not with the total suppression and absence of the corresponding permanent one, but with its presence in an abnormal position.

I am indebted to my friend, Mr. Walter Jones, of Worcester, for the loan of several interesting drawings illustrative of this impaction of certain of the permanent teeth deep in the substance of the maxillary bones; in some cases associated with the retention of the corresponding temporary teeth, in others the presence or absence of these is not indicated.

As it seems to me, a record of the specimens should not be lost.

1. The first drawing illustrates a specimen in which the first bicuspid tooth of the lower jaw, on the left side, is impacted in the substance of the bone immediately behind and above the mental foramen: it has an oblique direction, the crown

FIG. 1.



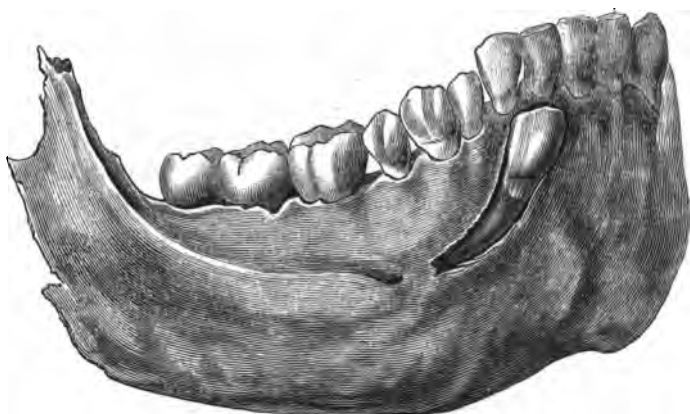
pointing upwards and forwards. The tooth is somewhat curved in form, and at its extremity there is a nodule of exostosis; it is of about natural length and size, and its upper extremity is about two lines below the edge of the alveolus.

There is a second drawing from the opposite—the right side of the same jaw, in which precisely the same condition exists. On this side, however, the bone has not been sufficiently chipped away to see the condition of the extremity of the fang. I have not thought it necessary to publish this second figure.

2. The second illustration is that of an inferior maxilla of an adult, in which all the permanent teeth are present in their natural position, except the right canine: in its place, between the lateral incisor and the first bicuspid, the temporary tooth is

firmly retained. By removing the front of the bone the permanent tooth is displayed, passing obliquely upwards and forwards from just in front of the mental foramen to a position

FIG. 2.



opposite the upper part of the fangs of the right lateral and central incisors; the point of the cusp, corresponding to the interval between these teeth, is about a line from the upper surface of the bone.

3. The third figure is of the lower jaw of a child, in which all the temporary teeth are present. Near the base of the

FIG. 3.



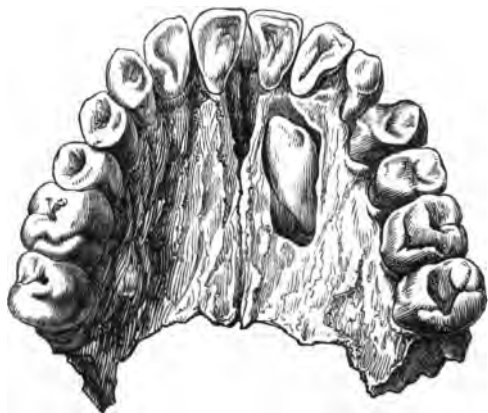
jaw, scarcely two lines from its lower edge, at a position a little



in front of the point intermediate between the chin and angle of the bone, is seen (by the removal of the outer table of bone) a molar tooth, in a horizontal position, the crown looking forwards. The fangs seem perfectly formed, and the tooth matured. Apparently it is the second permanent molar. The distance of this tooth from the alveolar edge, and its direction, are very remarkable.

4. The fourth figure represents a specimen, in which the canine of the left side of the upper jaw is placed obliquely and almost horizontally in the substance of the maxilla. The tooth was originally covered by bone, which has been removed. The point of the cusp is immediately to the left of the incisive

FIG. 4.

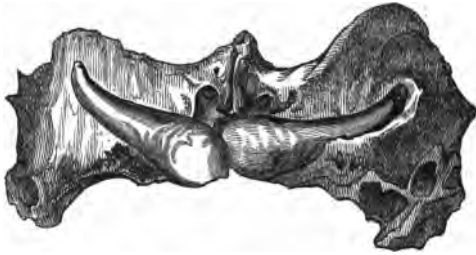


foramen, the crown of the tooth behind the fangs of the central and lateral incisors, the neck above and behind the fang of the temporary canine, in front of and above the first bicuspid. The point of the fang is situated just in front, and exterior to the antrum. The temporary canine remains. The tooth on the right side was normally situated.

5. The fifth example is essentially the same as the previous one, but affecting both sides. In this instance the points of the canines are in contact, immediately behind the incisive

foramen. The jaw is that of an aged person, from which many of the permanent teeth were shed ; and whether the temporary

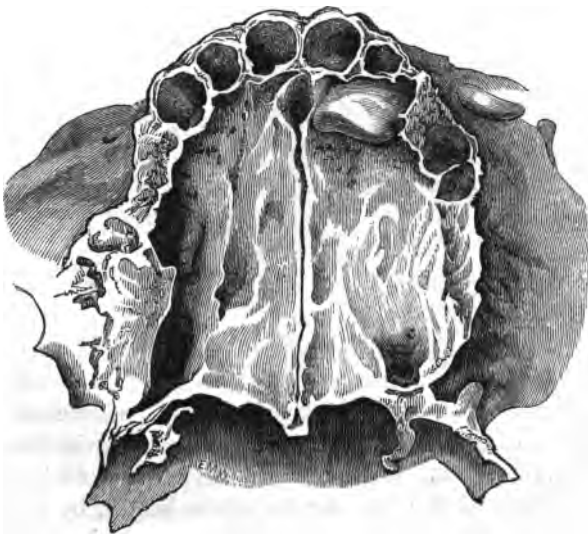
FIG. 5.



canines were retained during any period of adult life does not appear.

6. The sixth illustration shows the left permanent upper canine imbedded in the palatal process of the maxilla, im-

FIG. 6.



mediately behind the alveoli of the central and lateral incisors ; the fang of the tooth points backwards and slightly outwards.

In the previous cases the suppressed or imbedded teeth have been displayed by opening up the surface of the jaw by artificial means; but it occasionally happens that the progressive absorption of the alveolar surfaces, frequently even after all the originally apparent teeth have been shed, exhibits these imbedded teeth, at very advanced periods of life; and where, in unobservant persons, these members of the permanent dental series have not been missed from the set, the circumstance has given rise to the idea of a partial third set of teeth.

Four examples of this condition (the appearance of suppressed teeth in the mouths of aged—otherwise edentulous people) have come under my notice of late—two cases in my own practice—and two others, casts of which have been given me by Mr. Thompson, of Denmark Hill.

7. In the first-mentioned of these, many years after the mouth had been edentulous, and when the patient had reached the seventieth year of her age, an elongated elevation on the alveolar border of the upper jaw, on the left side towards the front of the mouth, was observed. In time the surface of

FIG. 7.



the gum gave way, and displayed the left permanent canine tooth lying in a strictly horizontal position, and in the axis of the arch of the jaw. At the present time the tooth is attached to the surface of the jaw, for its whole length, by that which should be its anterior surface, while its posterior surface and sides, from the apex of the root to the summit of the crown, are exposed. The tooth is tolerably firm, and the patient still

retains it. This case is in all respects analogous to the specimens figured in illustrations 4, 5, and 6; its history, however, is defective. It is not known whether the temporary canine was retained for any unnatural time, but it is quite clear that the permanent tooth was never in its place.

The accompanying figure is from a plaster cast of the mouth, showing the position, *in situ*, of this tooth on the otherwise edentulous gum.

I would here observe, that in all these examples of impaction of permanent teeth in the substance of the jaw, in those represented in the drawings, and in the model of this patient's mouth, the impacted teeth, it will be seen, are themselves perfectly developed, but having, in one set of examples, a wrong position associated with a normal direction, that is, the teeth are developed too deep in the substance of the jaw while the direction of their growth has been natural, and having, in the other set of examples, an abnormal direction while the position as regards proximity to the alveolar edge is natural—in each case presenting circumstances which were efficient to bring about this impaction in the jaw, and incompatible with the extrusion and replacement of the temporary teeth by the permanent.

Now there is yet a third condition in which, though the tooth grow in a right direction and is originally in a right position, it still remains impacted in the substance of the jaw—the temporary tooth retaining its original site; this circumstance being dependent upon, or rather, I should say, associated with, the non-development of the fang of the permanent tooth. The only instance in which I have witnessed this condition was that of a patient under the care of my colleague, Mr. Cock, at Guy's Hospital; and as the case is of itself interesting in several points, I will give a short abstract of it.

A young woman, æt. 18, applied to Mr. Cock at Guy's Hospital, about four years since, on account of a swelling of the upper jaw, immediately above the left central incisor tooth, and extending up to the base of the nose. The tumour evidently consisted of an expansion of the incisive bone in the situation indicated, and contained fluid. Mr. Cock requested

my opinion of the case ; and upon examining the mouth I found that the left central incisor was a temporary tooth, which had not been previously recognised. I at once suspected that the permanent tooth was imbedded in the jaw, and that its capsule was the seat of the cyst (having seen a somewhat similar case before), and this turned out to be true. The temporary tooth was first extracted, and its root was found entire and unabsorbed ; and upon removing the permanent tooth it was found to consist of little more than the crown, the fang having grown but about one fifth of its natural length, and thus it was that it never reached the level of the contiguous teeth, and never extruded its predecessor. Remaining imbedded in the incisive bone, it either set up by its presence such irritation as caused the serous secretion in the sac that it occupied, or, irritation being set up from some other cause, its presence determined the development of the serous cyst. The latter is most probably the case, as the tooth had occupied its then position for many years.

I may mention that this is the second instance in which I have seen the capsule of an impacted permanent tooth dilated into a serous sac. In the other instance the tooth was an impacted dens sapientiæ of the lower jaw ; and the particulars of this case are briefly these :

The patient was a young man of about twenty-two years of age. He had been admitted into Guy's Hospital on account of a large swelling of the left angle of the lower jaw. The swelling was tense and elastic, clearly contained fluid, and it occupied the centre of the bone which was distended by it. The cyst was first opened within the month, and a considerable quantity of serum escaped, the swelling quickly subsided, and the patient experienced considerable relief. In a few days, however, the orifice closed, and the fluid rapidly re-collected. An incision was then made at the extreme angle of the jaw externally, so as to open the cyst at the most dependent part, but with exactly the same result. I was then requested to see the patient, and on inspecting his mouth I found that, while the right inferior wisdom tooth was thoroughly through and in its right position, the left was wanting, and there was no indication of its approach whatever. I noticed that the

second molar in front of the swelling was loose, and the surrounding gum much inflamed. From the first inspection of the mouth, I suspected—what turned out to be the real nature of the case—that the serous cyst was the dilated sac of a misplaced tooth, and that the looseness of the second molar arose from the pressure of the sac of the dens sapientiæ itself. I determined, as the previous treatment had been of no avail, to remove the second molar, both to relieve the pressure which its condition indicated, and as a probable assistance in investigating further the nature of the case. When the second molar was extracted, it was found that a considerable portion of the posterior fang had been removed by absorption, presenting an even concave excavation. On passing a probe into the socket of the posterior fang, it immediately came in contact with the crown of the dens sapientiæ, which was thus exposed to the surface. The impaction of the tooth had now virtually ceased, and with that cessation the serous secretion vanished—the cyst no longer existed, and the patient left the hospital well.

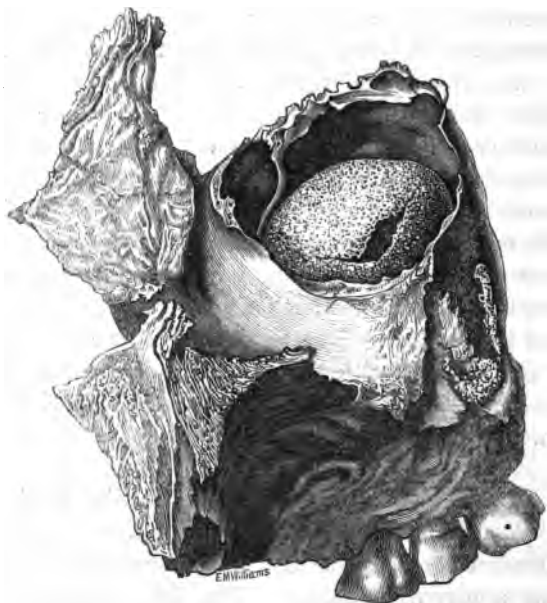
I am not aware that cases precisely similar to these have been placed on record; especially as in the first instance, where neither pressure of contiguous teeth nor any other source of irritation was apparently present. The fact, however, that the osseous covering of an impacted tooth may expand into a serous cyst is interesting pathologically and important surgically.

Through the kindness of my friend, Mr. Samuel Cartwright, jun., who, with his accustomed liberality, has placed the specimen at my disposal, I am able to add an interesting illustration of a superior maxilla, in which the capsule of a tooth had clearly expanded into a serous cyst, the case having been undoubtedly analogous to the previous ones.

It is often very difficult to obtain pathological specimens illustrative of diseases which do not kill or shorten life; and, where the symptoms which they produce are of a transient nature, histories attached to such specimens, when ultimately obtained, are often very imperfect or wanting. This example is the more interesting from its rarity and the difficulty of obtaining such specimens, but it has the too common defect of *no history*. It does, however, tell its own tale.

The specimen is a right superior maxilla: it is an adult bone, with three molar teeth remaining. There is nothing in the *external* configuration of the bone indicating disease. The

FIG. 8.



turbinated bones are gone, and the antrum maxillare is open. In the antrum, starting from its base, but not attached to its lateral walls anywhere, is an exceedingly thin, delicate capsule of bone, about the size of a chestnut, white, with a granulated surface. During life there had been no external aperture, and there is no indication of thinning at any particular spot, for the discharge of fluid contents. There is now a ragged fracture and small orifice, accidentally made, by which the interior can be examined. The bony capsule contains nothing but one small loose supernumerary tooth, the bony covering of which undoubtedly has produced this capsule by expansion. That the now empty bony sac originally contained fluid cannot be questioned. It cannot have been pus. Pus, forming in connexion with the teeth in the substance of the jaws, only occurs where the teeth are diseased: moreover it immediately

produces absorption of bone at the point nearest the surface: such an even, thin, bony expansion, and with sound teeth, would not be associated with pus-secretion. Undoubtedly this capsule was a serous cyst, and, if so, is an anatomical demonstration of the pathological changes in such cases as I have been describing. Whether this expansion was still in progress, and had been arrested at this stage by the death of the person in whose jaw it existed, or whether it had reached its full development and was remaining *in statu quo*, can be mere matters of speculation now; but the surgeon should not lose sight of the fact that an expanding tumour in the antrum maxillare, or indeed in any part of the maxillary bones, may depend on a serous cyst involving a misplaced tooth.

## II. WARTY TOOTH.

In the last volume of the 'Guy's Hospital Reports' I published an account of an abnormal formation of teeth called "warty," in which the crowns of the teeth exhibited excrescences more or less resembling the complicated surface of a tegumentary wart.

Among the examples adduced was one which I have subsequently found had been misinterpreted; and my object in now recurring to the subject is to correct that misinterpretation, and to place the case in its true light.

The example to which I refer is the last, in which I considered that the warty mass represented an independent tooth—was, in fact, a supernumerary tooth placed behind the dens sapientiæ. The subsequent history of the case has shown, however, that this was not so, but that the adventitious growth was an excrescence attached to and being part of the dens sapientiæ, and having the same relation to it as the wart has had to the tooth in the other instances I then described. I need not recur to the early history of the case, as it is already recorded ('Guy's Reports,' vol. iv, p. 279). Some weeks after I had removed the last portion of the adventitious tooth-substance (which gave considerable temporary relief), the



patient again came to me, suffering much pain in the wisdom tooth itself, extending along the jaw on the same side, and down to the shoulder. Upon examining the wisdom tooth, I found it was slightly loose, and raised above its fellows—clearly causing alveolar periostitis. By carefully passing the *searcher* over its surface, I detected on the posterior face of the neck, an irregularity, and I suspected a small carious cavity. However, no applications gave relief tooth, and, in a few days, I found it must inevitably be extracted—so I removed it. The nature of the original malformation and the cause of the recent suffering were at once apparent.

On the posterior aspect of the tooth, near the neck, was an irregular jagged projection with a minute orifice in its centre, through which a fine bristle could be passed into the pulp-cavity of the tooth. (See fig. 1.) It was clear now that the warty mass, which I had considered as a separate tooth, had been attached to the dens sapientiæ at this spot, and had had, through the minute orifice, a pulp-cavity common with that of the tooth.

FIG. 1.



In the paper already alluded to ('Guy's Reports,' vol. iv, p. 279), I remarked—"The surgeon-dentist should recollect that, where there is only a partial warty malformation appended to an otherwise normally formed tooth, the excrescence, especially if near the neck of the tooth, may be readily confounded with a mass of tartar. Such a mistake would be fatal to the tooth; the thin laminæ of the spongy mass would readily yield to the force of the scaling instrument, and the pulp-cavity would be opened." Though I was not aware of the fact at the time, I had singularly verified this assertion: the spongy mass was not mistaken for tartar, but its removal by the elevator opened the pulp-cavity and led to the symptoms which were the immediate cause of the necessary extraction of the tooth—an operation, however, which, under any circumstances, must sooner or later have been performed.

Upon making a section of this tooth, it was found that the pulp had entirely disappeared, and that the interior of the pulp-cavity had commenced decaying. The continuity of the pulp-cavity with that of the previously removed warty

mass was now more clearly demonstrable, as the black bristle introduced into the small external orifice is seen to enter the pulp-cavity of the posterior fang. (See fig. 2.)

In an illustration of a warty tooth published in the sixth volume of the 'Transactions of the Pathological Society' (p. 173, pl. ix, fig. 2), this community of pulp-cavity is also demonstrated. It has been suggested to me that these warty masses may be independent supernumerary teeth adherent to contiguous ones, but both the present example and the one to which I have just referred sufficiently disprove this supposition.

FIG. 2.



## CASES OF INJURED ARTERIES.

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BY ALFRED POLAND AND CONSTANTINE HOLMAN, M.D.

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CASE I.—*Traumatic aneurism of the ulnar artery in the palm of the hand; ineffectual ligature of the artery to and from the sac; ligature of the radial; perfect recovery.*

(Notes furnished by Mr. CHARLES LOVEGROVE.)

The following interesting case is here recorded, not only on account of its rarity, but in consequence of the treatment requisite for its cure.

Robert O—, æt. 19, a healthy and strong young man, stated that about nine weeks back he was holding the bowl of a clay tobacco pipe in his right hand, which he was filling, and squeezing the tobacco into it with some force, when the bowl broke and cut his hand severely to the outer side of the pisiform bone in the course of the ulnar artery. Much hæmorrhage ensued, which was checked by temporary appliances. He went to a surgeon, who dressed the wound by means of strapping and compresses. The wound healed rapidly, and he was considered cured. About five weeks afterwards a swelling began to form in the site of the cicatrix, which began to throb and beat, giving him at times considerable annoyance and pain. This tumour gradually increased in size up to the date of his admission into Guy's Hospital. The man stated that, shortly before his coming to the hospital, he had surgical advice, and the tumour was

considered to be an abscess, and required relief by the lancet, but he declined having any opening made into it.

On examination there was found a pulsating tumour, of the size of a pigeon's egg, and of much the same shape, situated in the palm of the hand, over the course of the ulnar artery, its centre being exactly opposite to the division of the ulnar into its continuation trunk, forming the superficial palmar arch, and its deep branch passing beneath the muscles to complete the deep palmar arch. The tumour was elastic, pulsated freely, and appeared to be entirely of a fluid character; it was readily commanded, and disappeared on pressure of the brachial artery. Pressure on the ulnar artery possessed no control whatever, even when made on both sides of the sac, but compression of ulnar and radial arteries completely arrested all pulsation.

Under chloroform an incision was made along the course of the vessel, so as to expose freely to view the sac itself and the trunks leading to and from it; a large quantity of granular fat bulged out and completely blocked up the wound, hiding the parts beneath. This was speedily dispensed with by a few cuts of the scissors, which enabled us to obtain a correct view of the injury. The sac was not opened, as is usually recommended and adopted, but it was freely exposed by dissection, when it was found to extend upwards in an infundibuliform manner along the wrist for about an inch; here the artery was found normal, and a ligature placed around it and secured; the lower part of the sac was abrupt and rounded off, and emerging from it was distinctly visible the trunk passing to form the superficial palmar arch. This likewise was isolated and included in the ligature. The effects of these two ligatures above and below the sac had no control whatever, for the sac pulsated as freely as before. On further careful dissection the sac was found to extend itself deeply into the palm of the hand in the course of the deep trunk, and the source of supply was found to be from that part, and as it was impossible to secure the vessel without injury to adjacent structures, it was at once determined to place a ligature on the radial artery, so as to prevent the supply from the deep palmar arch. The effect of this was immediate, and all pulsation stopped forthwith. The hand and fingers were wrapped

up in cotton wool. The wounds healed quickly, and the ligatures came away on the ninth day. The sac was allowed to relieve itself spontaneously, which it did by ulceration, about the same time that the ligatures were thrown off, and gave exit through the wound to a dark-coloured semi-fluid coagulum.

*Remarks.*—Here is a departure from the rule laid down in operative surgery, viz., that in all traumatic aneurisms we should freely lay open the sac and secure both ends of the divided vessel. Now we carefully weighed this proceeding in the present instance, and declined doing so in consequence of the want of control by pressure on the vessel above and below the sac, and in consequence of the fact that the wound had involved the artery where giving off a large communicating branch with the chief source of supply on the radial side. The sac might have been laid open and the artery secured above and below after much difficulty and obscurity, but its deep source of supply could hardly have been reached without much trouble and injury to the neighbouring important parts, in consequence of the sac having dissected its way down to the deep palmar space. The operation, as performed in the present instance, was one entirely bloodless, and attended with perfect success.

My friend Dr. Constantine Holman, of Reigate, has kindly permitted me to publish the following case, as bearing upon the subject of the departure from the ordinary rule when unforeseen difficulties arise; in not being able to secure both ends of a divided artery, and where the ligature of the sources of supply are found to be sufficient.

*CASE II.—Wound of the radial artery; ligature of both ends; hæmorrhage not arrested; ligature of ulnar artery; recovery.*

*Dr. Holman's case.*—William P—, æt. 45, a muscular healthy man; whilst killing pigs he inflicted a wound in the left wrist by his running it on to the point of his knife. The blood “spirted” out to some distance, but was controlled by binding the wound up tightly, and then he applied for medical advice. The bandages were removed, and arterial

hæmorrhage immediately ensued, which was arrested by the application of a tourniquet upon the brachial artery. The radial artery was found divided just as it passes beneath the extensor tendons of the thumb; the external cutaneous nerve was also severed. The proximate end of the vessel was secured without difficulty, and the distal end was carefully searched for, but it had retracted beneath the wound, and could not be reached without injury to the tendons, &c. The superficialis volæ and three or four smaller and muscular branches were tied, but without arresting the flow of blood, which still issued freely and per saltum; still it was deemed advisable to enlarge the wound in the track of the vessel around the base of the thumb, and a further search was made, when the divided vessel, from which the bleeding proceeded, was secured, and hæmorrhage then successfully controlled. The wound was covered with a piece of lint and the man kept quiet. However, in the space of half an hour, arterial hæmorrhage again occurred, and all attempts to find the bleeding vessel failed; and as the bleeding was profuse, it was considered advisable to secure the ulnar artery. All hæmorrhage immediately ceased, and, after the lapse of an hour, the hand was placed on a splint and well enveloped in cotton wool, and the man allowed to proceed home, a distance of four miles. From this time the case progressed favorably, without a bad symptom, the ligatures came away on the twenty-fifth day, and in two months the man had good use of the hand, with the exception of numbness along the back of the thumb, in consequence of division of the nerve. He had good use of his hand subsequently.

Dr. Holman remarks: "I believe both ends of the vessel were really secured, but still the bleeding returned, and compelled me to have recourse to ligature of the ulnar artery. It is not improbable that some other vessel had been injured in addition to the division of the radial, and hence the want of success in arresting hæmorrhage after tying both ends of the divided artery."

We cannot refrain from adding another important case, although the injury to the artery is perhaps not in connexion with such vascular supply and inosculation as is to be met

with in the palm of the hand ; yet its treatment and issue bear well upon the subject of the control of ligature on the proximate end of an artery in traumatic lesions.

**CASE III.**—*Necrosis of the head of the fibula ; operation for its removal ; subsequent aneurism of the anterior tibial artery ; unsuccessful attempt at ligature of vessel at seat of injury ; ligature of femoral ; recovery.*

The following case also occurred in the practice of Dr. Holman, whose detail thereof is thus cursorily described :

Miss R—, æt. 14, of delicate constitution, had a fall on some rough flints four years and a half ago, and cut her left knee ; the wound was dressed by a surgeon, and the healing thereof made a very slow progress, when she began to get much out of health. About three months after the fall an abscess formed on the outer side of the knee-joint, which burst and discharged a tolerably healthy pus ; this discharge at times diminished in quantity, but did not altogether cease, and at other times it poured out in large streams. After some time she went to town and consulted Sir B. Brodie, who advised emollient poultices to the part, good diet, and free use of the limb. The discharge continued, sometimes profuse, at other times scarcely appreciable ; the power over the limb was good, and she frequently took walks of five or six miles. During the Christmas of 1857 the catamenia first appeared, and soon after this her health began to be seriously impaired. Dr. Holman was first called to see her in the middle of August, 1858. She had been getting much weaker for some time past, and had had severe pain in the joint, which was found tender and puffy ; and over the anterior tibial muscles, about an inch below the joint, there was a fistulous opening which seemed to lead to the head of the fibula, and in which direction a probe could be passed down to diseased and bare bone ; but it apparently could not be made to reach the tibia. An exploratory operation was advised, and agreed to ; and on the 31st August chloroform was administered, and the wound freely laid open, when it was found that the fibula was healthy, and that the disease ex-

isted in the head of the tibia. Considerable portions of the necrotic bone were removed by the gouge, after previously enlarging the opening in the bone by means of the chisel; there was not much hæmorrhage, but what little there was appeared to be venous. The wound was dressed with wet lint. In about an hour, hæmorrhage of a more arterial character occurred, which, however, ceased on the application of cold, but again recurred at the expiration of ten or twelve hours, to a considerable amount, and of a decidedly arterial nature. The wound was carefully cleaned of all clots, and a diligent search made for the bleeding vessel, however without success; the oozing appeared to be general, and the blood seemed moreover to well up from the cavity of the bone. A plug composed of pieces of sponge was introduced into this cavity, and a compress of lint, steeped in the tincture of the sesquichloride of iron, placed in the wound. Vomiting ensued, which gave some trouble, but was checked by ice given her to suck. All went on well until the tenth day after the operation, when a diffused pulsating swelling was found on the inner side of the wound, together with some general œdema around; most of the plugs had by this time come away. On the following day the tumour became larger, and the pulsation more distinct, and it was evident that there was an aneurism of the anterior tibial artery. Under these circumstances, Mr. Poland, of Guy's Hospital, saw the case, and in consultation it was determined to lay open the sac, and seek the cause of the hæmorrhage, and to tie the anterior tibial artery, if necessary. Chloroform was given, and the wound enlarged; the sac was freely laid open, and a search made for the bleeding vessel, when it was found that the bleeding proceeded from the anterior tibial artery, which was injured close to the interosseous space. Ineffectual attempts were made to seize and secure the artery; its great depth and retraction beneath the interosseous space prevented any justifiable measures to follow it up, hence it was deemed expedient not to incur the risk of further hæmorrhage in her already exhausted and weak state, but to apply a ligature on the femoral artery forthwith, which was done by Mr. Poland, in the upper third of the femoral region. The progress of the case from this time was satisfactory; all bleeding ceased, and the ligature came away.



on the fourteenth day. The wound soon assumed a healthy aspect, and nothing like bare bone could be felt; the power of motion in the limb is gradually improving, and she walks well with the assistance of a stick.

*Dr. Holman's remarks.*—"There are several points of interest. First, as to the cause of hæmorrhage: did it arise from a wound of the artery during the operation for removal of the diseased bone? or did it arise from a diseased state of the vessel itself, consequent upon its lengthened exposure to deteriorating proximity to diseased bone? or did the two attacks of hæmorrhage and the aneurism proceed from different sources? It would, perhaps, be more probable that the artery sustained some injury during the operation, although all due care was taken to prevent such an accident, the only fact militating against this idea being the time at which the bleeding came on. The hæmorrhage was distinctly venous at the time she was placed in bed, and the arterial loss did not accrue until twelve hours after the operation was over. Secondly, as to the treatment of the hæmorrhage: when careful search was made, no point could by any possibility be found from whence the loss took place; it apparently *welled* up from the cavity in the bone, and did not appear to proceed at all from the situation of the anterior tibial artery; this point I was careful in making out. The plugging seemed to have all the desired effect, and matters were apparently going on well until the tenth day, when the pulsating swelling made its appearance in the wound. The increasing dimensions of the aneurism gave rise to serious anxiety as regards further hæmorrhage, and this in her already enfeebled condition could but have ill been borne. Mr. Poland's opinion was also strongly against too great a delay. And now one of the points of practical value in the case: prolonged and careful search could not detect any trace of the anterior tibial artery. The tumour apparently consisted of a number of very small varicose vessels, some of which could be tied; there remained, therefore, but one course to pursue, viz., ligature of the femoral artery, in order to prevent any chance of further hæmorrhage. The artery was tied in the usual position, at the point of Cowper's triangle, and this measure was most satis-

factory in its results. Another point of interest is, that on the second occasion of administering the chloroform, when the patient was weakened by loss of blood, she was speedily under its influence, and did not subsequently suffer from sickness or any ill effects; whereas, on the first occasion, the sickness was distressing and troublesome. I have before had occasion to notice this difference as regards the effects of chloroform, and am confident it may be exhibited with more freedom than it is at present in cases of collapse, whether from hæmorrhagic loss or nervous shock."

*Mr. Poland's remarks.*—When the case was first seen by me the child was blanched and exceedingly low from repeated hæmorrhages, and it was important to adopt some decisive measure at once. There was a traumatic aneurism connected with the anterior tibial artery, just where it emerged through the interosseous opening, and although it was determined to lay the sac open freely, it was candidly stated that we should be unsuccessful in reaching the proximate end of the artery, as it had probably retracted behind the opening, and that ligature of the femoral was the only chance. The sac was freely laid open, and the incision fairly carried down between the muscles to the interosseous space; the blood welled up, but in vain could we reach the bleeding end, after careful and prolonged attempts; hence it necessitated the immediate application of a ligature on the femoral artery. My opinion, at the time, was that the aneurism had resulted from perforation by necrotic bone, and that on the removal of the bone the hole in the artery became exposed, and gave rise to the subsequent hæmorrhage; and I was the more convinced of such being the case, in consequence of the vessel being wounded behind the interosseal space, close to its origin. I do not think it could have been wounded at the operation for removal of the bone; it was too deep to reach it in the ordinary manner.

*Old dislocation of both hip-joints from strumous disease; spontaneous casting-off of the head of the right femur, which was found in an abscess below Poupart's ligament, and removed.*

(Communicated by Dr. CONSTANTINE HOLMAN, of Reigate.)

The preparation was sent to the Museum of Guy's Hospital, with the following details of the case :

Esther H—, æt. 14, a delicate, strumous-looking girl, was brought into Reigate Workhouse Infirmary, with abscesses about both hip-joints, which were discharging thin, curdy pus. There was old-standing dislocation of both thigh-bones into the ischiatic notch, and there were several scars of former abscesses, as also in both feet, in the right arm, and in the lumbar region, from which latter situation she said that three pieces of bone had come away. She had, moreover, on admission, a large sloughing sore over the sacrum. The girl had been under medical treatment, but had been getting worse for some time. The abscess on the left side ceased to discharge, and the sloughing soon healed after a short time under a generous diet, stimulants, tonics, and rest. That on the right hip continued to discharge from an opening situated a little below Poupart's ligament, about midway between the pubes and anterior superior spine of the ilium. A fluctuating spot was, after a time, detected in the neighbourhood of the great trochanter, and was opened, a thin discharge continuing from both openings. On examining the upper opening, on the 13th of August, 1858, a foreign body was found lying a short distance within it; this was extracted with little difficulty, and proved to be the head of the femur, separated almost exactly at its junction with the neck; it was lying quite loose, and no hæmorrhage nor constitutional disturbance followed its removal. The discharge gradually lessened in quantity and became of a more healthy character, and the wound filled up with granulations, and ceased to discharge in about three months. She has since had slight collections of pus about the

left arm and wrist, and in the last few days a small abscess has formed near the place of exit of one piece of bone; this opened spontaneously, and is now discharging a thin, curdy fluid, free from fœtor. The femur seems to have slipped back completely into the ischiatic notch, where there seems to be some attempts at the formation of a joint. She has the power of flexion over the limb in a slight degree, and also of adduction, but less so; she is quite unable to rest any weight on legs, and she has pretty fair health.

The preparation is marked No. 1318<sup>15</sup>, and is described as "Epiphysis of the head of the os femoris spontaneously separated in a case of disease of the hip-joint. The cartilage is entirely gone, and the surface of the bone is slightly eroded in one or two spots. The part which joined the remainder of the head is irregular and spongy, and slightly hollowed out, so that the external denser articular lamina of bone slightly overlaps it all around."

ON SOME POINTS  
IN  
THE DIAGNOSIS AND TREATMENT  
OF  
HEART DISEASE.

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BY G. H. BARLOW, M.D.

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I HAVE been led to make the following remarks upon some points connected with the diagnosis and treatment of diseases of the heart because I am of opinion that there are many questions connected with the pathology, and, consequently, with the rational treatment of diseases of this organ, which are continually presenting themselves to us in practice, and that too with an urgency requiring immediate answers, but of which I do not find the explicit solutions in the works of the most distinguished authors, though they may, no doubt, be implied and included in their expositions of the pathology and diagnosis of such affections. The subject, moreover, is so vast that I shall only venture upon a very small part of it, though, in so doing, I hope to point out that the greater number of valvular diseases of the heart, and, I may add, a considerable proportion of diseases of the organs of circulation in general, have a tendency to range themselves into one or other of two large classes, according to which classification our treatment should be in a great measure regulated.

Now here I would premise that, though much labour and ingenuity have been employed upon the semeiology of cardiac

disease, and more particularly upon the interpretation of the signs furnished by auscultation, these signs have been too little connected with the general symptoms, an omission which has, as I believe, somewhat impaired their value in a diagnostic, but still more in a therapeutic point of view. Now, in regard to the arterial pulsations, which we should naturally regard as next in importance to those of the heart itself, I cannot discover that much attention is paid to enabling the reader to connect the different varieties in the pulse at the wrist with different forms of heart disease, and the same may be said of the action of the lungs, the liver, and the kidneys. For instance, we are informed, in general terms, that the liver may be gorged and the urine scanty and turbid in heart-disease, but I think we may look a long while before we shall find it suggested that jaundice, from hepatic congestion or scanty and turbid urine, belongs more to one form of such disease than another.

Let us begin with the aortic sigmoids. When there is exudation of lymph upon the surface of these valves, or between the layers of endocardium of which they consist, there will be more or less narrowing of the orifice through which the blood passes into the aorta, and therefore there will be heard, upon auscultation, a bellows murmur accompanying the first sound, and traceable upwards along the course of the aorta. It may happen, however, and generally does so, when the effusion is between the layers of the valves, that, by the contraction of the effused lymph, the valves become puckered, and, consequently, inadequate to the closing of the orifice, and in this case there will be a double or see-saw murmur heard in the position just pointed out. Now, lesion of these valves has a very characteristic influence upon the pulse at the wrist, which, in the case of obstruction, is sharp and compressible, rather defective in volume, but still more so in persistence, when compared with the impulse of the heart. When, however, there is regurgitation through these valves, whether from the above cause or from ulceration or laceration, it is large in volume and very compressible; it is, in fact, of the water-humour or splashing character. The rhythm of the heart, under these circumstances, is not disturbed, and the pulse neither intermitting nor irregular.

If we turn our attention to other organs, we shall find that in the earlier stages of disease of the aortic valves the circulation in the lungs is but little, if at all, disturbed, and, therefore, that, except under exertion, the respiration is easy; the liver is not gorged, and there is fair performance of its functions; and as the portal circulation, as well as the passage of the blood through the cava, is unobstructed, there is a free secretion of urine.

Let us now consider the symptoms of disease of the mitral valves. When such exists, whether it be obstructive or regurgitative, the auscultatory sign is generally supposed to be a systolic bellows murmur, most distinct towards the axilla, though, in the case of obstruction, it perhaps, extends more towards the right side than in that of regurgitation; the murmur is, moreover, to be distinguished from that arising from aortic disease by its not following the course of the aorta. I must, however, here express my belief that we ought not to regard the presence or absence of this murmur as deciding the question of the presence or absence of disease of the mitral valves, since its *immediate* connexion with such disease is, to say the least, doubtful. In the case either of obstructive, or regurgitative disease there will be the symptoms of obstruction to the pulmonic circulation—dyspnœa, livor, and other signs of venous congestion, sometimes hæmoptysis—and a very small and often intermittent pulse. The right side of the heart will become gorged, and therefore the liver, the consequence of which will be a diminished secretion of bile, the effects of which will generally show themselves in the colour of the urine and often in that of the skin. From the obstruction to the portal circulation the urine becomes scanty, so much so, that on cooling it generally throws down some of its solid ingredients, especially the urates, and, besides its being tinged with bile, there is often a deposit of purpurine.

Hence, upon comparing these two forms of disease, we see in almost every symptom a remarkable contrast. The pulse, in disease of the aortic valves, is large, splashing, and regular; in mitral disease it is small, and often intermittent. In aortic disease there is little or no dyspnœa, in that of the mitral valves it is urgent. In the former disease the complexion is for a long time natural, in the latter it is, almost

from the first, livid, and often icteric. In the former the urine is abundant and clear, in the latter it is scanty, high-coloured, and turbid. And, not to carry the contrast further, let us turn to the mode of death. When death occurs *immediately* from disease of the aortic valves, it is by syncope, when it is from disease of the mitral valve it is by apnoea.

I need hardly say that both the one form and the other of these diseases may be closely simulated by others, a remark which applies more particularly to disease of the mitral valve.

Thus, a dilated ventricle in an anæmic subject, with lax arteries, will present most, if not all, of the symptoms of disease of the aortic valves, and the same may be said of disease of the ascending aorta. Whereas I do not hesitate to say that other forms of pulmonic obstruction, as, for instance, long-continued capillary bronchitis, may present all the symptoms of diseased mitral valve, murmur inclusive. I have, however, adduced these forms of disease as typical of the two great classes into which most diseases of the heart—I had almost said of the circulatory system—seem to arrange themselves. I consider that the great difference between them consists in the obstruction (for, after all, regurgitation is practically the same as obstruction) originating on one side or the other of that great barrier, the mitral valve. The tendency of disease of the heart is to propagate itself backwards, that is to say, in the opposite direction to the current of the circulation. Now this tendency is, in the case of aortic disease, opposed, and often for a long time successfully opposed, by the perfect closure of the mitral valves, so that it is not till after the continued stress before the left ventricle has, by impairing its strength, led to dilatation, and rendered it unable to empty itself, and consequently to receive so readily the blood from the other side of the mitral valves, that the obstruction begins to propagate itself to the lungs, the right heart, lungs, &c. Whereas the closure of the tricuspid valve being siologically imperfect, disease tergal to the mitral valve is rapidly propagated—the lungs, right heart, and liver becoming gorged in rapid succession—the effect being much the same whether the disease consists originally in obstruction or regurgitation at the mitral valves, or in impediment to the pulmonic circulation from severe bronchial obstruction.



I have already suggested that the great danger arising from disease of the aortic valves (in the first instance) is sudden death from syncope, an event which has occurred not very unfrequently, whereas the next thing to be dreaded is gradual failure of the power of the left ventricle (generally in the form of dilatation, without compensating hypertrophy), the consequence of which is that the patient is brought practically to the predicament of a person suffering from disease of the mitral valves, whereas, in the case of the latter disease, we have a rapid supervention of dangerous engorgement of vital organs; hence it follows that, barring the risk of sudden syncope, the danger is much more remote in disease of the aortic than in that of the mitral valves.

Again, as regards the principles of treatment, I may remark that, both for the purpose of obviating the danger of sudden syncope and counteracting the tendency to dilatation, a tonic and often stimulating plan of treatment is indicated, the object being to maintain the tone of the system, and, as much as possible, to prevent the dilatation and promote some amount of compensating atrophy. We must, at the same time, try to relieve the circulation by keeping up a free action of the excretory organs. It would occupy too much space were I to enter minutely into details, but I may mention that I have frequently found the sulphate of zinc useful as a tonic in such cases. There is also a form of medicine which I have for many years been in the habit of prescribing, somewhat empirically, consisting of a combination of hyoscyamus, nitric æther, and decoction of senega; and I may add, that where there is palpitation from diseased aortic valves, without any other serious complication, the benefit from this medicine is invariably great; and I may add that in other forms of cardiac, and I might almost add of pulmonic disease, the more the pulse and other symptoms approach to those of disease of the aortic valves, the more confidence have I in the senega.

In disease of the mitral valves, on the other hand, although the pulse is much more feeble, I do not find the same advantage from stimulants as in disease of the aortic valves; by their use we often increase the palpitation without strengthening the pulse. In such cases we must look mainly to

relieving the circulation through the portal system, and nothing will often be found to give so much relief (notwithstanding the feebleness of the pulse) as free catharsis, after which we may often be enabled to establish a free action of the kidneys. Relieving the pulmonic circulation by free expectoration, where it can be effected, is also a valuable adjuvant; and here I would add, as in the former case, that the same rules of treatment apply to all affections of the circulatory system, in proportion as their symptoms approach to those of mitral disease. And I believe likewise that we might extend this remark to the opposite forms of subacute or asthenic bronchitis, which we not uncommonly meet with—I mean those forms of the disease in which there is in the one dyspnoea and wheezing, owing to the walls of the tubes being thickened and their calibre thereby diminished, and in the other excessive puriform secretion. In the former of these there is obstruction to the functions of the bronchial tubes by change in their structure, and the chief auscultatory sign is wheezing; in the latter, where the chief disturbance is from the great muco-puriform secretion, there are large rattles. In the former there is great lividity; in the latter there is, indeed, a slight livor of the lips, but otherwise there is pallor. In the former there is a bloated countenance, and sometimes general œdema; in the latter there is emaciation. In the former the patient dies suffocated; in the latter he sinks exhausted.

I was once led, by the observation of the condition of the left ventricle in poisoning by digitalis, to try the effect of that drug in disease of the aortic valves, where death generally takes place with an opposite state of the ventricles. The result of my observations, however, was that my theory was perfectly wrong whereupon I had recourse to it in what I consider the opposite form of disease, namely, that of the mitral, and in several cases, although the pulse was intermittent, with marked benefit. It is in such cases too, provided the urine is not albuminous, that the combination of a grain each of calomel, digitalis, and squill, so often successfully employed by my experienced colleague, Dr. Addison, will be found eminently useful.

CASES ILLUSTRATIVE  
OF  
THE ETIOLOGY  
OF  
ENLARGEMENT OF THE HEART.

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BY G. H. BARLOW, M.D.

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THE following cases have been kindly furnished me by my friend and colleague Dr. Wilks, who has extracted them from the post-mortem records of the Museum at Guy's, as the cases of fatal heart disease which have occurred during the last two years, and in which there has been no affection of the valves, or adherent pericardium, to account for its production. "In some of these cases," adds Dr. Wilks, "the symptoms and death were due alone to the cardiac disease; in others, renal disease existed as a complication."

It had for a long time been taught that adherent pericardium was one of the causes of enlargement of the heart, and I believe that Dr. Chevers, now the able secretary to the director-general of the medical service of H.M. Indian Army, one of the most distinguished physicians whom Guy's has ever produced, was the first to show the fallacy of this doctrine, and to point out that in all cases where enlargement of the heart, whether in the form of hypertrophy or dilatation, coexisted with adhesion of the pericardium, there were some other lesions, generally of an obstructive valvular character, producing an increased stress upon the muscular walls of the organ, and giving rise to hypertrophy or dilatation, or both. I myself, nearly contemporaneously

with Dr. Chevers, published some cases ('Guy's Hospital Reports,' first series, vol. vi, p. 235, and vol. vii, p. 467), from which it appeared that where enlargement of the heart accompanied pericarditis, and there was no other lesion present which might not be regarded rather as an effect than a cause, the adhesion of the pericardium was not the direct cause, but that it acted mediately by impeding the respiration, and thereby obstructing the pulmonic circulation. After, however, a considerable portion of cases of enlarged heart had thus been disposed of, there remained a residue in which there was neither any disease of the valves or adhesion of the pericardium to account for the cardiac lesion; and it was with a view of explaining these that I contributed my last series of select clinical reports, and as some time has now elapsed since the publication, I may revert to the principles then enunciated.<sup>1</sup>

"I. In the first place, it is well known that increase of function in muscular structures produces increase of nutrition, provided there be not, from other causes, any deficiency in the activity of this latter process; but the function of the muscular structure of the heart is to empty the cavities of that organ, and the natural stimulus of the muscular walls of the heart is the blood in those cavities. Increase in the quantity of the blood in any cavity of the heart, or obstruction to its exit from that cavity, must therefore, *per se*, tend to produce increased nutrition, or hypertrophy of the walls of that cavity.

"This accumulation may arise from two classes of causes:

"1. Obstruction arising in the orifices of the heart, or in the remoter course of the circulation.

"2. Obstruction arising from changes in the quantity or physical properties of the blood which is to pass through these orifices and canals.

"II. When, however, there is considerable deficiency in the activity of the nutritive function (which must sooner or later take place where there is long-continued visceral disease), the hypertrophy, which is the natural, and, within certain limits,

<sup>1</sup> "Select Clinical Reports," by G. H. Barlow, M.D., 'Guy's Hospital Reports, Series 2, vol. v, p. 173.

the compensating result of increase in the quantity of blood within the heart, and also of obstruction to its passage from it, cannot ensue. The result of this is, that the cavity thus distended yields to the increased distending force, and becomes enlarged, or, as we term it, dilated. It is also evident that the same thing must ensue where there is defective strength of the muscular walls of the heart, independently of any obstruction to the exit of the blood from its cavities. Dilatation, then, may arise from two classes of causes :

“1. Increased quantity of blood in the cavities of the heart.

“2. Insufficiency of strength in the muscular walls of the heart to overcome the ordinary distending force.

“Now it will at once be seen, that the former of these includes both the conditions which were assigned as tending to produce hypertrophy ; the result, whether hypertrophy or dilatation, or both, being determined by the degree of activity of the nutritive function. Consequently, when we speak of enlargement in the more comprehensive sense in which it is used above, we may reduce the causes which tend to produce it to three classes, viz.—

“1. Obstruction from changes in the orifices of the heart, or in the course of the circulation.

“2. Obstruction arising from changes in the quantity or physical properties of the blood.

“3. Deficiency of strength in the parietes of the heart itself.”

It is of the second and third classes that the following cases are mainly illustrative.

CASE I.—*Great enlargement of the heart ; no mitral “murmur ;” first sound obscure.*

James G—, æt. 45, died under Dr. Wilks's care, in January, 1857. He was an army-accountment maker, and stated that he had had always good health, with the exception of an attack like the present about twenty years before (renal dropsy ?), but perfectly recovered. His present illness commenced about four months before his death, when his breath became short, accompanied by great oppression at the chest, and after two months more his legs began to swell. On admission he was seen to be a very big, fat man, suffering from great oppression of breathing and sense of suffocation ; the abdomen contained fluid, and the legs were anasarcaous. The heart's sounds were with difficulty heard, owing to the rolling character and tumultuous action of the heart, but on attentive examination the second sound was found to be clear, but the first or systolic was very obscure, and no decided bruit was ever observed ; occasionally this sound appears reduplicated. The urine was albuminous, without casts. Subsequently, hæmorrhage from the lungs came on, with other symptoms of apoplexy of these organs, and he was in a dying state for nearly three weeks. The albuminous urine was regarded merely as the very common secondary affection from cardiac disease, which was considered to be the nature of the man's complaint.

*Post-mortem examination.*—The lungs were apoplectic, the right universally adherent by old cellular tissue, the left merely by apex ; the liver nutmeg ; the spleen and kidneys healthy, as well as all other organs, excepting the heart ; this was much increased in size, weighing twenty-four ounces. The shape of the heart was still preserved, as the enlargement was nearly uniform in all parts ; the right auricle and ventricle dilated and hypertrophied, as well as the left auricle and ventricle, but none of these cavities in excess of the other ; the left ventricle was dilated and the walls thickened. The right side distended with the usual fibrinous coagulum, and the left ventricle was filled with a dark, soft clot, as well as a large ante-mortem coagulum, which had already softened down into a pus-like fluid. All the valves were structurally healthy, but the left auriculo-ventricular orifice appeared abnormally large ; the measurements

given by the cone (which, however, cannot be regarded as a very accurate indicator) were as follows: mitral orifice, four inches in circumference; tricuspid, four and a half inches; aortic, three and a quarter, and pulmonary three and a half, these being about the normal size. There was only a slight excess of fat upon the heart; within, the muscular fibre was pale, but no fatty streaks were visible to the naked eye; the microscope showed numerous granules of fat within the fibrillæ, though nowhere had the natural transverse markings been destroyed, and thus it could only be said that a fatty degeneration was commencing in the tissue. The coronary arteries were extremely diseased, the walls covered with patches of atheroma, and scarcely any trace of a healthy coat left. The pericardium was healthy. Weight, twenty-four ounces.

Here we have the third class of causes mainly in operation, for the microscope revealed only a commencing fatty degeneration yet the muscular fibre was pale and ill-nourished, the coronaries being much diseased, and it is but reasonable to suppose that an attempt would be made to compensate for the loss of power by increased development of the muscular fibre.<sup>1</sup>

*CASE II.—Enlargement of the heart, due to endocarditis and floodings.*

Lucy W—, æt. 34, died under Dr. Barlow's care, in February, 1857. She was a married woman, and when twelve years of age had a severe attack of rheumatic fever. She had been married ten years, during the whole of which period she had been in delicate health, which she attributed to numerous miscarriages; her severe symptoms had only been present a few weeks. She was admitted in a dying state; great difficulty of breathing, and bronchial râles throughout the whole of the chest, which prevented the cardiac sounds being heard, but no bruit was distinguishable. The urine was albuminous; lower part of body dropsical.

*Post-mortem examination.*—Lung showed much engorgement of bronchial tubes, with secretion, and few old pleuritic adhesions on both sides; liver nutmeg, kidneys congested, but healthy to

<sup>1</sup> At the same time it is not improbable that the circulation was impeded by changes in the smaller arteries similar to those in the coronaries.

naked eye, and the microscope showed merely excess of secretion and granular matter, as usually found in the kidneys of those dead of cardiac disease. *Heart.*—This gave evidence, both within and without, of a former severe inflammation; the pericardium was roughened all over, and the front part had a thick layer of hardened deposit upon it. The endocardium in like manner was much thickened, especially in the left ventricle, but more at the apex than near the valves, where the whole surface was covered by a thick and opaque fibrous layer, and thus the smaller muscular trabeculæ were not only enveloped in this tissue, but some of them actually changed into it; both within and without the heart the thickened serous membranes encroached upon the wall of the ventricle and penetrated its tissue, in various places. The muscular tissue of the ventricle had a remarkably streaked appearance, from the presence of a fibrous tissue pervading it, so that at least half of its bulk was thus affected. The heart was universally enlarged in all its cavities, but the left ventricle disproportionately so, and its dilatation was in excess of its hypertrophy, the walls being only slightly increased in thickness, but its cavity much enlarged—almost to twice the natural size—and it was of a rounded form; the walls gradually diminished in thickness downwards and were extremely thin at the apex. The valves were healthy, for, owing to the endocarditis having been at the lower part of the ventricle, the mitral had escaped. The mitral orifice appeared slightly larger than natural. Coronary arteries healthy. Muscular fibre had undergone the fibrous change before mentioned. Weight of heart, twenty ounces.

In this case we have the combined action of the second and third classes of causes, for though there was no manifest visceral disease, whereby the depuration of the blood could have been interfered with, there had been repeated hæmorrhages, the tendency of which would have been to diminish the proportion of the solid contents of the blood, and thereby render its transmission through the extreme circulation more difficult, since it is a known physical law that a somewhat viscid fluid can be propelled through capillary tubes more readily than a perfect liquid; but, besides this we have the effects of the inflammation of the endocardium and pericardium upon the inner and outer



fibres of the walls, since we find it to be a general rule that muscular fibres underlying an inflamed membrane lose their contractility; this would give rise to dilatation, and some attempt at compensation in the way of hypertrophy.

The next case admits of nearly the same explanation as regards the effects of endocarditis, though something may be due to the slight valvular disease.

*CASE III.—Enlargement of heart, with slight general thickening of the endocardium.*

Mary Ann G—, æt. 15, died under Dr. Hughes, February 26th, 1857. The mother of this child, after repeated questionings, stated that the child had never had rheumatic fever, nor any disease resembling it. She was healthy as an infant, but when about four years ago she was becoming very delicate, was short-breathed, and unable to run with other children. These symptoms increased, but she was never very ill until about a year before admission, when swelling of the ankles appeared, with all the more formidable symptoms of cardiac disease. She was admitted very ill with dropsy, and a systolic bruit existed, which was considered due to mitral disease.

*Post-mortem examination.*—Lung indurated, no pleuritic adhesions, liver nutmeg, other organs healthy. Heart had a round white patch near the apex. It was much increased in size, but more especially on the left side. Right auricle dilated; right ventricle enlarged, and walls hypertrophied. Left auricle extremely dilated and walls very much hypertrophied, causing a very remarkable enlargement of this cavity; left ventricle very much dilated in all directions, and making its capacity apparently twice as great as natural; walls of uniform thickness throughout and not increased in size. Muscular fibre healthy. The endocardium on both sides of the heart appeared somewhat thickened, the edges of the mitral valve were slightly so, and the orifice enlarged, admitting three fingers through it easily, which should not have been the case with a child's heart. Two of the aortic valves were slightly adherent at their edges, but there was no insufficiency in consequence. The edges of the curtains of the tricuspid valve were also slightly thickened.

In this case there was no appreciable mitral disease, though there was the murmur commonly referred to that affection.

*CASE IV.—Bronchitis, with enlargement of right side of heart and diminution of left ventricle; loud systolic bruit under left nipple extending round to axilla.*

Bridget S—, æt. 48, died under Dr. Barlow's care, February, 1857. She stated that she had had a cough since childhood, and inflammation of the lungs several times. During the last twenty years she had been obliged to lay up several weeks in the winter time; but the present attack worse than ever, and now accompanied by dropsy.

*The post-mortem examination* showed in the lungs both old and acute disease. The smaller tubes dilated, but having the mucous membrane so swollen and vascular that they were almost closed in some places. The heart was of a rounded form, owing to the enlargement of the right side, the walls of the ventricle being considerably thickened. The left ventricle was very small, and the mitral orifice correspondingly narrowed. Weight, nine ounces. Other organs congested, but healthy.

This case affords an instance of enlargement of the heart arising from obstruction to the circulation, independently of valvular disease, the obstruction being in the pulmonic circulation, resulting from the extensive disease in the smaller bronchial tubes, much of which had no doubt existed since childhood. When obstruction of this kind exists before growth is complete, there will generally be found a great excess in the development in the right side of the heart beyond that of the left, a circumstance to which I drew attention many years ago ('Guy's Hospital Reports,' 1st series, vol. iii and vol. iv), the orifices on the left side often becoming narrower, owing to the smallness of the current passing through them. The series of causation may be thus traced: old bronchitis and dilated tubes, impediment to the passage of the blood through the lungs, engorgement and consequent hypertrophy and dilatation of the right auricle and ventricle, nutmeg degeneration of the liver, dropsy, &c. But whilst we notice the great changes commencing in the lungs and propa-

gated in the direction contrary to the course of the circulation, we should not overlook the less obvious but no less significant ones anterior or distal to the seat of the obstruction, the left ventricle being very small and the mitral valve correspondingly narrowed.

*CASE V.—Enlargement of heart, with commencing Bright's disease.*

John N—, æt. 55, under Dr. Hughes, April, 1857. He was a potman, and very intemperate, subject to winter cough, but no rheumatism. Admitted with all the symptoms of heart disease; lower part of body dropsical, the upper part slightly jaundiced. Great dyspnœa and hæmoptysis. No distinct cardiac bruit was perceptible.

*Post-mortem examination.*—No pleuritic adhesions; apoplexy in various parts of lungs; liver in extreme nutmeg condition; kidneys slightly granular on surface, and in incipient stage of the chronic degeneration. The heart was very much enlarged in all its proportions, the right side hypertrophied in proportion to the increase in size, but the left ventricle was not proportionally hypertrophied, for the walls were only about the usual thickness, while the cavity was much enlarged, of a rounded form, bulged posteriorly, and was full of soft coagulum. The heart presented no appearance of there ever having been any inflammation within; the valves were all thin and flexible, but the mitral cords were long and flaccid. The auriculo-ventricular orifice was inordinately large, and was supposed to admit regurgitation. The muscular tissue was healthy, but the coronary arteries were much diseased. Pericardium healthy. Weight of heart, seventeen ounces.

It is by no means improbable that in this case there was regurgitation through the mitral valve, though there was no murmur: the murmur, as I have elsewhere pointed out, not being necessarily or immediately connected with regurgitation through this valve. It may be asked what was the series of diseased changes in this case, and the answer is not so obvious or so simple as in the former. We have, as it were, two points of departure—winter cough and continued intemperance.

By the former of these there would be produced dilatation, and, as far as the powers of nutrition were sufficient for it, hypertrophy in the right side of the heart; and it is probably on this account that the walls of the right cavities were thickened, whilst on the left the ventricle was large, but the walls not thickened. But what causes can be assigned for the changes in the left side? These will, I believe, be accounted for mainly by his intemperance, among the effects of which may be reckoned chronic change in the smaller arteries, and degeneration of the muscular tissue, whereby its contractility is much diminished. That the smaller arteries were thus affected may be inferred from the disease in the coronaries. The effect of this disease would be to throw an additional strain upon the left ventricle, under which it yielded, and became dilated, the auriculo-ventricular orifice dilating with it. With hypertrophied right ventricle and imperfect mitral valve there is no difficulty in accounting for the pulmonary apoplexy, even were there no tendency to hæmorrhage induced by the jaundice.

CASE VI.—*Bright's disease, with dilated left ventricle.*

Edward E—, æt. 35, under Dr. Barlow, May, 1857. No history found, but the case was treated as one especially of Bright's disease, from there being albuminous urine, with little dropsy.

*Post-mortem examination.*—No pleuritic adhesions; small masses of apoplexy in lungs; advanced granular degeneration of the kidney. Heart showed the pericardium slightly opaque and thickened, as from a former inflammation; the whole generally enlarged, and weighing eighteen ounces. The right side hypertrophied and enlarged, the left ventricle considerably dilated, but the walls only slightly increased in thickness; the left auriculo-ventricular orifice appeared larger than usual, but the valve was healthy, as was the aortic. The muscular tissue was soft, flabby, and yellow.

**CASE VII.—Bright's disease, with dilated left ventricle, producing cardiac symptoms.**

Esther M—, æt. 39, under Dr. Habershon, May, 1857. Married woman, with large family. Twenty years before, she had had rheumatic fever, and since been often troubled with rheumatic pains. Her present illness began with symptoms of pleurisy, three months before, and with which she was admitted. She at the same time had the general symptoms of heart disease, the legs were dropsical, the urine was albuminous, the heart's action was irregular, and a slight systolic bruit was audible.

*Post-mortem examination.*—Pleurisy; on both sides lymph and serum, and recent pneumonia; fluid in abdomen; liver in an extreme state of nutmeg degeneration; kidney in advanced granular degeneration. *Heart.*—Pericardium healthy; increased in bulk from undue size of left ventricle. The right side was distended with blood, and contained some *ante-mortem* clots, but the size of the cavities was natural; the left ventricle was also distended with dark, semi-fluid blood, and its cavity was dilated beyond its natural dimensions, but the walls retained their normal thickness. The valves were structurally healthy, excepting it might be said that the edge of the anterior curtain was slightly thickened. The muscular fibre was very much diseased and fatty; it was soft, and very lacerable, and the microscope showed the fibrillæ in all parts occupied by fat.

Where there exists Bright's disease of the kidney of any considerable duration, we need be at no loss to account for enlargement of the heart independently even. The changes in the blood consequent upon the disease in the kidneys would of itself form an obstruction to the extreme circulation, and, as a consequence, cause distension of the left ventricle, not to mention that this lesion of the blood is also a common cause of that chronic change in the smaller arteries to which we have just now alluded.

CASE VIII.—*Enlargement of the heart.*

Frances H—, æt. 41, under Dr. Rees, June, 1857. He was very intemperate up to five years ago, when he became a teetotaller; he said that eight months before admission he had rheumatism, followed by dropsy and present symptoms. He had all the symptoms of heart disease, but no distinct bruit could be heard. Urine albuminous.

*Post-mortem examination.*—No pleuritic adhesions; apoplexy of both lungs; liver in extreme nutmeg condition. Kidneys large and firm, displayed some exudation by microscope, but the condition was considered to be secondary to the cardiac affection. *Heart.*—Pericardium healthy; whole heart enlarged, but more especially on left side, weighing eighteen ounces. The right side somewhat increased in size, but the left ventricle very much enlarged from hypertrophy and dilatation, it contained much recent coagulum and some *ante-mortem* clots; the muscular fibre healthy, all the valves healthy, but the left auriculo-ventricular orifice was large, and easily admitted four fingers through it.

CASE IX.—*Enlargement of heart; Bright's disease.*

James C—, æt. 81, under Dr. Rees, July, 1857. He had lived as potman at a public-house, and had been very intemperate, taking largely both of beer and spirits. He stated that he had been ill with shortness of breath and dropsy for six months. He was a bloated, drunken-looking man. Swelling of legs, urine albuminous, no distinct bruit ever made out.

*Post-mortem examination.*—Œdema and hepatization of lung; liver nutmeg, kidneys of natural size; but containing some white adventitious deposit, or were mottled. Heart very much enlarged from increase in all parts, weighing twenty-four ounces. The right side enlarged and walls hypertrophied, and left ventricle in like manner had its walls much thickened and the cavity dilated.

The two last cases are pretty simple and obvious instances

of the effects of habitual intemperance upon the walls and cavities of the heart. To enter at length into an analysis and explanation of these would be to repeat what has already been said.

CASE X.—*Enlargement of the heart.*

George P—, æt. 50, under Dr. Addison, April, 1858. Was admitted with dropsy and all the usual symptoms of heart disease; the action of heart was tumultuous and rolling in character; the first sound was not clear, but no very decided murmur could be heard. It was thought that it was a case of mitral regurgitation.

*Post-mortem examination.*—The left lung was universally adherent to the walls of the chest and to the diaphragm, and the right partially so; tissue healthy. *Heart.*—Pericardium healthy; bulk very much increased; weight, twenty-four ounces. The enlargement affected all parts; right auricle and ventricle dilated, and walls thickened, the left auricle also equally with other parts, or rather more so; left ventricle also much dilated and walls thickened especially at upper part; all cavities distended with blood. All the valves structurally healthy, but the left auriculo-ventricular orifice very large (more than four and a half inches in circumference), and admitting the five fingers through it. Liver nutmeg; all other organs healthy.

Dr. Gairdner, of Edinburgh, was present at the post-mortem examination, and stated his explanation of these cases of simple enlargement of the whole organ, in the manner described in his published papers, and which is simply this—that the pleuritic contractions of the lungs prevent their expansion and necessitate the enlargement of the heart, to fill up the vacant space in the chest. At his request the lungs were inflated, and found to be not perfectly expansible from the cause named. It may be remarked that in some of these cases now related there were adhesions, and in others none.

If we subject this case to analysis upon the principles already laid down, we shall, I think, have little difficulty in showing that, although the causes in operation are not included in any one of the categories enumerated at the commencement

of this paper singly, we shall find that all there enumerated were in operation, though chiefly those of the first and second classes. This case, it should be observed, was under the care of Dr. Addison, and was regarded as one of mitral regurgitation; hence we are justified in inferring that there were good reasons during life for believing that such a lesion existed; and, if we look to the post-mortem changes we find that they are precisely those which we might have anticipated from such a cause: for, though all the cavities of the heart were dilated and their walls thickened, this was more particularly the case with the left auricle, which, upon this hypothesis, was the cavity immediately behind the defective valve, and the series of changes would seem to be as follows: regurgitation through the mitral valve; dilatation and hypertrophy of left auricle; obstructed pulmonic circulation; engorgement of the right ventricle and auricle; engorgement of the liver and obstruction to the venous circulation generally; obstruction to the capillary circulation and consequently to the arterial current; obstructed flow of blood from the left ventricle into the aorta, and dilatation and hypertrophy of that chamber of the heart. It may, however, be reasonably asked, whence arose the enlargement of the left auriculo-ventricular orifice, since the heart was itself structurally healthy? This, I believe, is to be explained by the impediment to the respiration, and consequent obstruction to the pulmonic circulation, arising from the pleuritic contraction and consequent compression of the lung; the obstruction thus set up having been propagated backwards through the right heart, the veins, the capillaries, and the arteries, till it reached the left ventricle. For it will be found, upon observation, that in young subjects we do not ordinarily find the auriculo-ventricular orifice enlarged under these circumstances, whereas in those of more advanced age, in whom the tonicidity is less, it will commonly be found to become dilated in nearly the same proportion with the ventricle.

I have been induced to give the explanation of this case somewhat at length, since another reason has been assigned for the enlargement of the heart in this and similar instances, and that by an authority which must command our attention. Dr. Gairdner, of Edinburgh, states, in accordance with the views propounded by him in the '*Medico-Chirurgical Review*' for



1854, that he believed that the heart became enlarged in order to fill up the vacant space caused by the compression of the lungs from pleuritic adhesion. In the first place, it may be questioned whether simple pleuritic adhesion, unless effected by thick and strongly contracting fibrinous lymph, does really diminish the volume of the lung by its direct compression. But waving this objection, and admitting that we have a "*vera causa*" so far as the diminished expansibility of the lung is concerned, can we suppose that so important an organ of the heart is liable to be converted into a pad to fill up the vacuum, rather than that there should be flattening of the ribs? And, on the other hand, when the capacity of the chest is really small, ought not the heart to be small also, upon this hypothesis? The contrary, however, is frequently the case, and for the reasons already adduced. That defective expansion of the lungs will produce enlargement of the heart, I have elsewhere endeavoured to prove ('Guy's Hospital Reports,' first series, vols. iii and iv), but if the arguments there adduced are correct, that enlargement is owing to the obstructed circulation, which is the necessary consequence of that defect.

This view of the above case appears to derive confirmation from the following, in which we found a similar condition of the heart, but no pleuritic adhesion; the apoplectic lung, however, gave evidence of pulmonic obstruction.

#### CASE XI.—*Simple enlargement of the heart.*

Stephen P—, æt. 55, died under Dr. Addison, August 1858. He stated that he caught cold six months before his death, and this was followed by dyspnœa, swelling of legs, &c. He then came to the hospital, when the report says that his pulse was irregular, and a systolic bruit was heard beneath the nipple. He was relieved for a time, and when again admitted the heart's action was very tumultuous and irregular; impulse felt, and seen extending, over a large space. No decided bruit then audible, but the dyspnœa and fluttering of heart became much worse before death, with also occasional hæmoptysis.

*Post-mortem examination.*—Body dropsical, &c.; lungs had no adhesions, but were indurated and apoplectic; liver nutmeg;

kidneys large and coarse, otherwise healthy. *Heart*.—Pericardium healthy; whole organ much enlarged in all its proportions, and weighing twenty-three ounces; right auricle and ventricle dilated, and walls thickened; left ventricle much enlarged, but its walls not proportionally thickened. The muscular fibre pale and flabby, and some parts undergone fatty degeneration. Mitral orifice very large, admitting the points of five fingers; valve itself healthy, showing no signs of disease except the stretching and looseness of the cords. Aortic valves also healthy.

In the above case the tendency to degeneration in the muscular fibre of the heart was, no doubt, a concurrent cause of the dilatation.

*CASE XII.—Bright's disease; bronchitis; enlargement of heart.*

William H—, æt. 67, under Dr. Habershon, May, 1858: Intemperate man, and ailing with chest symptoms for three years; admitted with dropsy; no decided cardiac bruit.

*Post-mortem examination.*—Granular degeneration of kidney; heart very much enlarged in all proportions; all the cavities much dilated, as well as the walls thickened, including left ventricle, gorged with blood, and ante-mortem clots in right auricle. The muscular fibre and endocardium showed much degeneration, the former was pale, flabby, and soft; the coronary arteries could be felt running down the heart like solid tubes; the aorta was covered with atheroma; the mitral orifice large and cords flaccid, and at posterior valve a cretaceous mass and similar earthy deposits at the bases of the aortic valves. Liver nutmeg. Other organs healthy.

*CASE XIII.—Enlargement of heart, &c.*

Sarah R—, æt. 53, under Dr. Wilks, June, 1858. Admitted with dropsy, pleurisy, great dyspnoea, hæmoptysis, albuminous urine, &c. Symptoms of heart disease, but no bruit to be heard.

*Post-mortem examination.*—Lymph and serum on one side of chest, and serum on the other; lung-tissue contained several masses of apoplexy; liver nutmeg; kidneys rather contracted;

and commencing to degenerate. Heart, sixteen ounces, enlarged ; the right side dilated and hypertrophied ; the left ventricle dilated, without hypertrophy ; muscular fibre pale and soft.

**CASE XIV.—***Enlargement of heart, with tuberculosis.*

Elizabeth H—, æt. 17, under Dr. Rees, September, 1858. General ailments for nine months, and for six weeks much dyspnœa, with swelling of ankles. On admission, great difficulty of breathing, râles throughout chest, but no signs of disorganization. Heart violently palpitating, action tumultuous, but no decided bruit to be heard.

*Post-mortem examination.*—Both lungs filled with minute tubercles in every part ; tubercles in other organs and in lymphatic glands ; the kidneys and spleen occupied by fibrinous masses so frequently seen in cardiac disease. *Heart* enlarged in all parts ; left ventricle dilated and rounded in form. Mitral valve structurally healthy, and had no vegetations upon it, but the orifice was large, admitting three fingers through it, and having its fleshy columns acuminate and thinned, and cords loose, as in ventricular dilatation ; muscular fibre healthy.

**CASE XV.—***Bright's disease and dilated left ventricle.*

Samuel P—, æt. 58, under Dr. Addison, October, 1859. No history.

*Post-mortem examination* showed the body dropsical, liver nutmeg, kidneys small and degenerated. *Heart* contained softening ante-mortem clots in right auricle and left ventricle. The left ventricle dilated and rounded, and considerably pouched posteriorly ; the mitral valve healthy, but orifice dilated.

**CASE XVI.—***Enlargement of heart ; albuminuria.*

David J—, æt. 61, under Dr. Habershon, November, 1858. Admitted with dropsy, dyspnœa, &c. The râles in the chest prevented the heart's sounds being clearly heard. The kidneys were large and coarse, but otherwise did not show much disease. *Heart* enlarged in all its proportions, leaving its shape natural ; weight, eighteen ounces. Right side dilated and hypertrophied ;

left ventricle also enlarged and walls hypertrophied. Valves healthy; mitral orifice large.

After the explanations which have already been given, the five last cases need little or no comment, with the exception of Case XIV, where we have a different cause of obstruction from any hitherto noticed, namely, extensive tuberculosis of the lungs; but here, too, we find the same result in enlargement of the heart, though in such instances the lungs are generally turgid, and so far from there being any necessity for the enlargement of the heart, to supply the vacant space, we should, upon that hypothesis, expect the contrary.

CASE XVII.—*Enlargement of heart.*

Thomas A—, æt. 35, under Dr. Habershon, April, 1859. He had been ailing six months with dropsy, and other symptoms of heart disease; he also passed small calculi by the urine. He had acute pleurisy on admission, and a cardiac bruit existed, but whether endocardial or exocardial was never clearly made out.

*Post-mortem examination.*—Pleuritic adhesions on both sides of chest, and pleura very much thickened. The peritoneum was thickened, as from old inflammation; kidneys slightly granular in surface, and pelvis contained small lithic acid calculi. *Heart.*—Surface had numerous thickened patches of pericardium; whole organ much enlarged, weighing twenty ounces, but its proportions preserved. All the cavities enlarged, and walls increased in thickness; distended with blood; muscular fibre and coronary arteries healthy. Mitral and aortic valves healthy, but the mitral orifice large.

This case seems, more than any which has been adduced, to favour the views of Dr. Gairdner already alluded to; but, setting aside the kidney disease, it may be asked whether the enlargement of the heart may not be accounted for by the inflammation of the pericardium, since we know that other muscles underlying inflamed membranes lose their contractility, as is seen in the bulging of the intercostal spaces in pleuritic effusion, and the distension of the intestines arising

from loss of contractility of the circular fibres in enteritis, and, therefore, it is but reasonable to suppose that there may be loss of contractility of the superficial fibres, and consequent hypertrophy of those nearer the endocardium, as an effect of pericarditis.

ON

SOME FAILURES OF MARSH'S PROCESS

FOR THE

DETECTION OF ARSENIC.

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By WILLIAM ODLING, M.B., F.R.S.

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I recently had occasion to examine a specimen of earth containing both arsenic and copper. After it had been dried, and coarsely sifted to separate the large stones, it was found to have the following composition :

|  |       |
|--|-------|
| Organic matter . . . . .               | 10.09 |
| Sand, &c., insoluble in acid . . . . . | 76.92 |
| Oxide of iron and alumina . . . . .    | 8.73  |
| Oxide of copper . . . . .              | 0.31  |
| Arsenious acid . . . . .               | 0.07  |
| Alkaline and earthy salts . . . . .    | 3.88  |

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100.00

For the estimation of the arsenic, 1167 grains were taken, which furnished 1.04 grains of tersulphide of arsenic, equal 5.02 grains of arsenious acid per pound, or 0.07 per cent.

As might be expected, there was no difficulty in detecting the presence of arsenic in dilute muriatic decoctions of the soil, by means of Reinsch's process; but, most unexpectedly, neither dilute muriatic nor dilute sulphuric decoctions of the soil gave any indications of the existence of arsenic when tested in Marsh's apparatus. Thus, one hundred grains of the dried soil, boiled for half an hour with a

mixture of half an ounce of muriatic acid and three ounces of water, yielded a solution, in which no arsenic could be detected by Marsh's test. This experiment was frequently repeated. In some cases the frothing was prevented by the addition of alcohol, in other cases it was allowed to subside spontaneously, but in no case was any arsenical stain formed on porcelain, or any metallic deposit within a glass tube heated to redness during the transmission of the gas. But the liquid, when poured out of the Marsh's apparatus and boiled with a piece of copper-foil, gave at once a metallic deposit, which by volatilization yielded a crystalline sublimate of arsenious acid. In one experiment, two hundred grains of the soil were boiled for half an hour with one ounce of muriatic acid and six ounces of water. The filtrate was divided into two equal portions. One was tested at once by Marsh's process, and gave no stain whatever. The other was simply distilled to dryness, and the distillate transferred to the Marsh's apparatus, when it afforded characteristic stains with the greatest facility. In another experiment, the dilute muriatic decoction of a hundred grains of the soil was tested unsuccessfully in Marsh's apparatus; then removed therefrom, and distilled to dryness. The distillate thus obtained was returned to the Marsh's apparatus and tested, when decided arsenical deposits were at once obtained.

Similar experiments were made with sulphuric acid. The dilute sulphuric decoction of the soil, made by boiling one hundred grains of the dried soil for half an hour with a mixture of a quarter ounce of sulphuric acid and three ounces of water, gave no results in Marsh's apparatus; but when transferred to a flask, and boiled with muriatic acid and copper, gave an abundant arsenical deposit, and a subsequent crystalline sublimate. Moreover, when the hundred grains of this soil were acted upon by strong sulphuric acid and heated therewith, so as to produce a thorough charring of the organic matter, and then treated with water, the filtered liquid was found to react quite satisfactorily in Marsh's apparatus. The soil with which these experiments were made resulted from the admixture of three different samples. With each of them the same results were obtained. That is to say, their dilute muriatic decoctions did not afford any stains when tested in Marsh's apparatus,

but yielded clear evidence of arsenic when examined by Reinsch's process. It was also found that when one fiftieth of a grain, 0.02, of arsenious acid was added to one hundred grains of ordinary non-arsenical dried soil, and a decoction made by boiling for half an hour with dilute muriatic or sulphuric acid, the filtered decoction afforded no results whatever with Marsh's apparatus; while even the twentieth of a grain, 0.05, afforded but a scarcely visible stain upon porcelain. The minimum quantity of arsenic that can be detected by Marsh's process in similar decoctions of soils will probably be found to vary with the quantity and character of the organic matter contained in them. The dry soil above alluded to, to which the arsenic was purposely added, contained 6.86 per cent. of organic matter.

Two different specimens of grass that had been grown upon arsenical soils were examined as follows :

Quantities of the air-dried grass, or hay, the one weighing 175 grains and the other 140 grains, were each boiled for an hour in a mixture of half an ounce of muriatic acid with three ounces of water, and the liquids then filtered off. These decoctions were tested in Marsh's apparatus, but afforded no evidence of arsenic. They were then transferred into flasks, and boiled with metallic copper, upon which arsenical deposits, yielding crystalline sublimes, were readily obtained. I found also, that when the fiftieth of a grain of arsenious acid, 0.02, was added to one hundred grains of ordinary hay, and a decoction made by boiling for half an hour in dilute muriatic or sulphuric acid, the decoction failed to yield any trace of arsenic when tested by Marsh's process.

Two quantities of human stomach, each weighing two ounces, were boiled for an hour, one with dilute muriatic, the other with dilute sulphuric acid, and the decoctions filtered off and mixed with from a fourth to a third of their bulk of rectified spirit. To about three ounces of each decoction the one hundredth of a grain, 0.01, of arsenious acid was added, and the liquids then tested in Marsh's apparatus, but no arsenical stains could be procured; whereas ordinarily the one hundredth of a grain of arsenious acid in three ounces of dilute muriatic or sulphuric acid affords characteristic arsenical stains with the greatest facility. These results, obtained with arsenical soil



and with vegetable and animal tissues, prove, I think conclusively, that Marsh's process cannot be relied upon to detect minute quantities of arsenic in the presence of organic matter, that is, under conditions in which arsenic most frequently has to be detected, under conditions in which it can be most satisfactorily detected by Reinsch's process. But the gas evolved from the above-described different decoctions of organic matter and arsenic, although in no case sufficiently arsenical to afford stains upon porcelain by its combustion, was yet in most cases capable of producing a greater or less amount of discoloration upon paper moistened with nitrate of silver.

As far as my experience goes, by far the best and most ready method of extracting arsenic from organic substances in a state suitable for testing in Marsh's apparatus is a modification of the process devised by Schneider,<sup>1</sup> who recommended that the tissues, &c., after the addition of sufficient water to cover them, should be treated with fused common salt and strong sulphuric acid, taking care to keep the salt in excess. Upon gentle heating, chlorhydric-acid gas, carrying with it the whole of the arsenic in the state of terchloride, is evolved, and by its condensation in water furnishes a liquid which may be tested for arsenic by any of the usual methods. But this process is attended with some practical inconveniences resulting from the abundant frothing, and from the long time which the distillation occupies. Some years back I examined the stomach of a dog that had been poisoned by arsenic, by cutting it up into small pieces, drenching it with strong muriatic acid, and distilling to dryness. I detected arsenic in the distillate most readily, but the residue was not free from the poison, and I was inclined to regard the process unfavorably.<sup>2</sup> But from subsequent experience, I am satisfied that had I then treated the residue in the retort with strong muriatic acid, and again distilled to dryness, I should have entirely driven off the whole of the arsenic, arsenic being carried over most completely during the distillation of strong muriatic acid. It is only where there is any considerable dilution, as

<sup>1</sup> Poggendorf's 'Annalen der Physik und Chemie,' Jahr. 1852, Band. lxxxv, s. 433.

<sup>2</sup> 'Guy's Hospital Reports,' 1851, 3d series, vol. i, p. 294.

necessarily happens when a moist animal tissue is acted upon, that any appreciable portion of the arsenic remains unvolatilized.

The plan I now adopt is the following. Having cut or broken up the tissue, I place about a quarter pound of it in a beaker glass with one ounce and a half of water and half an ounce of muriatic acid. The beaker, with its contents, covered with a glass plate or large watch-glass, is then stood upon a sand bath, or hot plate, for about an hour, during which time a boiling, or almost boiling, temperature is maintained. There is no fear of any arsenic being lost during the digestion, for even the first half of the distillate from such a liquid does not carry off a trace thereof, unless, indeed, a very large proportion be present. After cooling, I filter, and thereby obtain a clear liquid, holding dissolved all the arsenic originally present, even when a great portion of it existed in the state of tersulphide, from the action of sulphuretted products of decomposition.<sup>1</sup> This solution is then in a suitable condition to be tested by Reinsch's process; but to fit it for Marsh's apparatus, I distil it to dryness, or almost to dryness. There is no frothing, or any other difficulty, until the liquid has nearly all passed over, when it is necessary to be careful. To the residue I add another half ounce of strong muriatic acid, and again distil. On first applying heat after this addition, there is usually considerable frothing, lasting, however, for a few minutes only, after which the distillation can be carried to dryness without any difficulty. The distillate from the strong acid I condense in the last two thirds, or the whole, of the previous distillate, according to circumstances. In this way I obtain a colourless acid liquid, well fitted for testing in Marsh's apparatus, and a small *caput mortuum* entirely free from arsenic. This residue can be dissolved out by more muriatic acid, or be acted upon by muriatic acid and chlorate of potash, or by nitro-muriatic acid, &c., and can then be examined for other metals by any of the usual processes. The distillate, instead of being tested in Marsh's apparatus, may be treated with a current of sulphuretted hydrogen gas, when the yellow sulphide of arsenic, in a well-characterised condition, is precipitated, which may be collected and weighed in the

<sup>1</sup> 'Guy's Hospital Reports,' 1851.

usual manner. Otto prefers this method, and objects altogether to the introduction of muriatic acid liquids into Marsh's apparatus, but, as far as I can judge, on insufficient grounds. Upon making comparative experiments with muriatic acid and sulphuric acid liquids in Marsh's apparatus, I have given a slight preference to the muriatic acid liquid. I have never found it furnish stains when arsenic was absent, and have been able to recognise in it somewhat more minute quantities of added arsenic, than in the sulphuric acid liquid.

The estimation of arsenic in the soil, with which the experiments first described in this paper were performed, was effected in the above-described manner. The 1167 grains of dried soil were boiled for an hour with dilute muriatic acid, in a Florence flask, to which a long upright tube was adapted, so as to ensure the condensation and flowing back of the volatilized products. The whole was then thrown upon a filtering paper, and the washings of the filter and its contents added to the filtrate, which was next distilled to dryness. The residue in the retort was then treated with half an ounce of muriatic acid, which was distilled off, and condensed in the previous distillate, and this treatment was repeated a second time. The residue then left in the retort did not furnish a trace of arsenic. The entire distillate, after dilution with water, was subjected to a current of sulphuretted hydrogen gas in excess, whereby an abundant yellow precipitate was produced, which, after subsidence, was collected on a filter, washed with cold water, and dissolved off the filter by ammonia. The ammoniacal filtrate was then evaporated to dryness, and thereby afforded a residue of tersulphide of arsenic, weighing 1.04 grains. This process of distillation with muriatic acid is also very convenient for the examination of certain metallic compounds which interfere with the action of Marsh's process. Thus, three ounces of dilute muriatic or sulphuric acid, holding dissolved the hundredth of a grain of arsenous acid, 0.01, and fifteen grains of sulphate of copper, will not afford any evidence of arsenic when tested in Marsh's apparatus, scarcely even a discoloration of nitrate of silver paper. But if fifteen, or fifty, grains of sulphate of copper, contaminated with the hundredth of a grain of arsenic, be acted upon in a retort, with from a quarter to half an ounce of strong muriatic

acid, and the acid be then distilled off and condensed in one or two ounces of water, a clear liquid is obtained, which reacts readily with either Marsh's or Reinsch's test.

The salts of mercury, which also impede Marsh's test, partly by checking the development of gas, partly by interfering, like the salts of copper, with its arsenical character, may be treated in a similar manner. The salts of lead are so readily fitted for the application of Reinsch's or Marsh's test by the simple addition of muriatic acid, and subsequent filtration to separate the great excess of lead, that the process of distillation with muriatic acid need not be resorted to. The proportion of lead that can be held in solution by dilute muriatic acid does not interfere, in any way, with the performance of either of the above-mentioned tests; but a large excess of lead will afford an arsenical-looking stain upon copper, and will interfere, though but to a slight extent, with the production of arseniuretted hydrogen.

Somewhat unexpectedly, the presence of bismuth, even in considerable excess, was not found to detract from the delicacy of Marsh's process for the detection of arsenic. A liquid, made by adding the hundredth, 0.01, and in one case the two hundredth, 0.005, of a grain of arsenious acid, and fifteen grains of subnitrate of bismuth, perfectly free from arsenic, to a mixture of one ounce of muriatic acid and two ounces of water, was found to furnish decided arsenical stains when tested in Marsh's apparatus. It is important to be borne in mind that the chlorides of bismuth, antimony, and tin, are very volatile, and, like the chloride of arsenic, are apt to be carried over, at least to some extent, during the distillation of muriatic acid.

Oxidizing salts likewise interfere with the action of Marsh's test. A mixture of five grains of chlorate of potash, the hundredth of a grain, 0.01, of arsenious acid, two ounces of water, and either an ounce of muriatic acid, or half an ounce of sulphuric acid, produces, by its action on zinc, an abundant effervescence of hydrogen gas, contaminated with some chlorine compound, from which, however, not the slightest arsenical stain can be procured. Nitrate of potash acts in the same manner as chlorate of potash, *quoad* the prevention of arsenical stains, although indeed to a very much less extent.

I find the following process well adapted for the preparation, from these and similar salts, of solutions suitable for being tested by Reinsch's or Marsh's process. I dissolve them in a small quantity of water, add an equal amount of muriatic acid, warm gently, and then treat with an excess of bisulphite of soda. This salt furnishes the most ready source of sulphurous acid. It ordinarily occurs in a semi-crystalline state, keeps well, is very pure, and, at any rate, may be readily examined for arsenic. In some cases the action of the bisulphite is very rapid, as upon the muriatic solution of chlorate of potash; in others its action is more gradual, as upon the muriatic solution of nitrate of potash; and, as a general rule, it is advisable to submit the solution to be reduced, to the action of the sulphurous acid, for from half an hour to an hour. In this respect my experience accords with that of Professor H. Rainey.<sup>1</sup> I then dilute the reduced liquid, which should smell obviously of sulphurous acid, with two or three times its bulk of water, and boil for about ten minutes in a flask. The steam at first given off contains much sulphurous acid, which is manifested by the violet colour developed upon a piece of starch-paper, moistened with solution of iodic acid, and held over the mouth of the flask. Gradually this coloration ceases to be effected, and the solution is then in a fit state to be tested by Marsh's, or Reinsch's, or the sulphuretted-hydrogen process. In applying Reinsch's test, it is more particularly necessary to get rid of the sulphurous acid, for in the presence of muriatic acid, sulphurous acid gives a stain upon copper somewhat resembling an arsenical, but more closely approximating to an antimonial stain. A mere trace of sulphurous acid has, however, no effect. The large dilution of the liquid with water prevents the volatilization of any chloride of arsenic during the ebullition employed to expel the sulphurous acid. This process of reduction by bisulphite of soda is sometimes useful, even when organic matter is present, as, for instance, in the acid decoction of a ferruginous soil. I have not found the presence of organic matter, animal or vegetable, to interfere appreciably with the expulsion of the sulphurous acid.

<sup>1</sup> 'The Lancet,' 1852, vol. i, pp. 397, 443.

## ADDENDA.

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### *Supra-renal Disease.*

IN a note at page 117, referring to disease of the supra-renal capsules, it is stated that the case related in the text had ceased to be the last, which had occurred at Guy's at the very time that the report of it was in the press. Only a fortnight after this another case came under notice, in the person of a lad who had been under the care of Dr. Aldis, at the Surrey Dispensary, and who sent it to Guy's as a good example of the affection. In the note referred to mention is made of two other cases, where the diseased organs were forwarded to Guy's for examination, and thus, since the first report went to the press, and before the completion of the present volume, four other well-marked cases have come under the notice of the author, in all of which the diagnosis was made during life as to the nature of the disease, a proof in itself of the certainty of the existence of morbus Addisonii.

### *Leucocythemia Splenica.*

At page 114 the case is related of a lad suffering from this affection, who at the time of printing the report was still under care in the hospital. He subsequently became very ill with cough, pain in the side, tenderness and fulness of abdomen, &c., with febrile symptoms, and gradually sank, dying on

September 12th. The *post-mortem* examination showed that the more acute symptoms were due to a scrofulous inflammation of the pleura and peritoneum, whereby these membranes were covered with a dry, tuberculated lymph; the lungs also contained tubercles. The *spleen* weighed three pounds two ounces, was remarkably dense and fleshy, but at the same time presented no abnormal appearance in structure, either to the naked eye or to the microscope; in fact, the enlargement was due to a simple hypertrophy. No affection of lymphatics or other viscera. The colon was firmly attached to the lower border of the spleen, and the omentum was curled upwards and adherent to its anterior surface. The blood, as during life, showed an equal amount of white as red corpuscles. A sister of the lad died, only a week before, of what was represented to be consumption, and thus, no doubt, a tuberculous diathesis existed. This is the first time we have seen the co-existence of tubercle and enlarged spleen, and is probably a mere coincidence.

## ERRATA.

In Vol. III of the present Series, a very important error has inadvertently crept into Mr. POLAND's Paper 'On Tetanus,' by which the proportionate number of cases under various circumstances, is decreased tenfold by the decimal point having been wrongly placed. The corrections are as follows:

### PAGE 18

|                     |   |   |   |   |   |                   |       |             |       |
|---------------------|---|---|---|---|---|-------------------|-------|-------------|-------|
| 4 lines from top    | . | . | . | . | . | <i>instead of</i> | ·006  | <i>read</i> | 0·063 |
| 6       "           | . | . | . | . | . | "                 | ·056  | "           | 0·56  |
| 6 lines from bottom | . | . | . | . | . | "                 | ·0107 | "           | 0·107 |

### PAGE 19

|                     |   |   |   |   |   |   |       |   |       |
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| 6 lines from bottom | . | . | . | . | . | " | ·0063 | " | 0·063 |
| 5       "           | . | . | . | . | . | " | ·0107 | " | 0·107 |
| 4       "           | . | . | . | . | . | " | ·0069 | " | 0·069 |
| 3       "           | . | . | . | . | . | " | ·0119 | " | 0·119 |

### PAGE 20

|                  |   |   |   |   |   |   |      |   |      |
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| 5 lines from top | . | . | . | . | . | " | ·056 | " | 0·56 |
| 7       "        | . | . | . | . | . | " | ·056 | " | 0·56 |

### PAGE 21

|                   |   |   |   |   |   |   |       |   |       |
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| 14 lines from top | . | . | . | . | . | " | ·0033 | " | 0·033 |
| 15       "        | . | . | . | . | . | " | ·0025 | " | 0·025 |
| 16       "        | . | . | . | . | . | " | ·0031 | " | 0·031 |
| 17       "        | . | . | . | . | . | " | ·0025 | " | 0·025 |
| 19       "        | . | . | . | . | . | " | ·0031 | " | 0·031 |
| 24       "        | . | . | . | . | . | " | ·0033 | " | 0·033 |
| 26       "        | . | . | . | . | . | " | ·056  | " | 0·56  |
| 27       "        | . | . | . | . | . | " | ·0025 | " | 0·025 |
| 28       "        | . | . | . | . | . | " | ·0031 | " | 0·031 |

### PAGE 23

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| 7 lines from top | . | . | . | . | . | " | ·0204 | " | 0·204 |
| 8       "        | . | . | . | . | . | " | ·0108 | " | 0·108 |

### PAGE 57

|                   |   |   |   |   |   |   |       |   |       |
|-------------------|---|---|---|---|---|---|-------|---|-------|
| 11 lines from top | . | . | . | . | . | " | ·0033 | " | 0·033 |
|-------------------|---|---|---|---|---|---|-------|---|-------|





LIST  
OF  
GENTLEMEN EDUCATED AT GUY'S HOSPITAL  
WHO HAVE PASSED THE  
EXAMINATIONS OF THE SEVERAL UNIVERSITIES, COLLEGES,  
&c. &c.,  
*Since September, 1853.*

---

**University of London.**

SECOND EXAMINATION FOR BACHELOR OF MEDICINE.

- |                               |   |                  |
|-------------------------------|---|------------------|
| * Mr. Robert George Hardwick. | } | First Division.  |
| * John James Nason.           |   |                  |
| Richard U. Wallace.           |   | Second Division. |
- \* Placed in Honours.

FIRST EXAMINATION FOR BACHELOR OF MEDICINE.

- |                             |   |                 |
|-----------------------------|---|-----------------|
| *** Mr. James Bankart.      | } | First Division. |
| James Beddard.              |   |                 |
| **** Frank Buszard.         |   |                 |
| * A. W. A. Evans.           |   |                 |
| ***** Charles Hilton Fagge. |   |                 |
| ** John Henry Galton.       |   |                 |

\*\*\*\*\* Obtained the Exhibition and Gold Medal in Anatomy and Physiology; the Exhibition and Gold Medal in Materia Medica; the Exhibition and Gold Medal in Chemistry; and the Gold Medal in Botany.

- \*\*\*\* Placed in Honours, Third in Anatomy, Third in Materia Medica, and Fourth in Chemistry.
- \*\*\* Placed in Honours, Fourth in Materia Medica, Fifth in Chemistry, and in Honours in Anatomy.
- \*\* Placed in Honours in Chemistry and Materia Medica.
- \* Placed in Honours in Anatomy.

**MATRICULATION EXAMINATION.**

\* John Makens . . . First Division.

\* Obtained the Prize in Botany.

---

**University of St. Andrew's.**

Dr. John Adcock.  
Francis E. Carey.  
Robert R. Stilwell.

\* Dr. Frederick H. Hewitt.  
William Lynes.

\* Placed First in the List of Honours.

---

**University of Aberdeen.**

Dr. William C. Hills.  
Thoma Fuller.

---

**Licentiate of Faculty of Physicians and Surgeons, Glasgow.**

Dr. Cregeen  
Edward Downing.

Dr. James Palfrey.

---

**Royal College of Physicians, London.**

**LICENTIATES IN MEDICINE.**

Dr. Joseph Williams.  
Donald Dalrymple.  
Thomas Buchanan Washbourne.  
Frederick John Bird.  
William Charles Hood.  
F. W. Lyon.  
Cuthbert Collingwood.  
Henry Greenwood.  
Henry George Noyes.  
George James Stilwell.

**Royal College of Surgeons of England.**

**FELLOWS BY EXAMINATION.**

**Mr. James Foster Gray.**

**MEMBERS BY EXAMINATION.**

**OCTOBER, 1858.**

|                                    |                             |
|------------------------------------|-----------------------------|
| <b>Mr. Nathaniel Paine Blaker.</b> | <b>Mr. Henry G. Rawdon.</b> |
| <b>Henry P. Walker.</b>            |                             |

**DECEMBER.**

|                                |                               |
|--------------------------------|-------------------------------|
| <b>Mr. John Adcock.</b>        | <b>Mr. Carter Murphy.</b>     |
| <b>Dr. Moses Henry Aikins.</b> | <b>Curtis J. Bird.</b>        |
| <b>Mr. James Bankart.</b>      | <b>Robert Nicholas Ingle.</b> |

**FEBRUARY, 1859.**

|                             |                          |
|-----------------------------|--------------------------|
| <b>Mr. Charles Sanders.</b> | <b>Mr. Henry Stokes.</b> |
|-----------------------------|--------------------------|

**MARCH.**

**Mr. Stephen Duke.**

**APRIL.**

|                            |                               |
|----------------------------|-------------------------------|
| <b>Mr. Bransby Brooks.</b> | <b>Mr. Humphrey Williams.</b> |
| <b>John M. Comley.</b>     | <b>John Wales.</b>            |
| <b>Allen Freshfield.</b>   | <b>John Candy.</b>            |

**MAY.**

|                                |                           |
|--------------------------------|---------------------------|
| <b>Mr. Buckmaster J. Tuck.</b> | <b>Mr. J. C. Gooding.</b> |
|--------------------------------|---------------------------|

**JULY.**

|                              |                              |
|------------------------------|------------------------------|
| <b>Mr. Matthew A. Adams.</b> | <b>Mr. John D. Hill.</b>     |
| <b>John Arminson.</b>        | <b>William Rowbotham.</b>    |
| <b>Alfred E. Barrett.</b>    | <b>Frederick R. Webster.</b> |
| <b>James B. Hodgson.</b>     | <b>James J. Sewell.</b>      |
| <b>Thomas Holman.</b>        | <b>William T. Salmon.</b>    |
| <b>Charles Lovegrove.</b>    | <b>William Terry.</b>        |
| <b>William E. G. Barnes.</b> | <b>Robert Barlow.</b>        |
| <b>Egbert Charlton.</b>      |                              |

FIRST OR ANATOMICAL AND PHYSIOLOGICAL EXAMINATION.  
DECEMBER, 1858.

|                       |                       |
|-----------------------|-----------------------|
| Mr. Bransby Brooks.   | Mr. Newton Greenwood. |
| Frank Buszard.        | Joseph Garside Terry. |
| Charles Hilton Fagge. | John Wales.           |
| Allen Freshfield.     | Humphry Williams.     |

JANUARY, 1859.

|                         |                   |
|-------------------------|-------------------|
| Mr. G. H. Atwell.       | Mr. J. H. Galton. |
| Matthew Algernon Adams. | J. C. Gooding.    |
| David Bowen.            | Henry Horsley.    |
| J. M. Comley.           | Thomas Kitchener. |
| Benjamin Simmons.       | Thomas Miller.    |

MARCH.

|                          |                        |
|--------------------------|------------------------|
| Mr. James Joseph Sewell. | Mr. John Arminson.     |
| Egbert Charlton.         | James Birkett Hodgson. |
| Charles Lovegrove.       | James Beddard.         |
| Buckmaster J. Tuck.      | Alfred Hopkins.        |
| Joseph May.              | John D. Hill.          |
| William J. Addison.      | William Thomas Salmon. |
| Alfred Evans.            | Alfred E. Barrett.     |
| William Rowbotham.       | Thomas Holman.         |
| John Cook.               | Frederick R. Webster.  |

APRIL.

|                      |                          |
|----------------------|--------------------------|
| Mr. Richard Davey.   | Mr. Issac Morris.        |
| Edward Fernie.       | Hugh Bennett.            |
| William Park.        | William Duncan Caldwell. |
| James Duce.          | John T. Mercer.          |
| John Bourne Bromley. |                          |

MAY.

|                         |                          |
|-------------------------|--------------------------|
| Mr. Henry Wright Lomas. | Mr. William Clunie Wise. |
| Henry Owens.            | George Aylwin Major.     |

JULY.

|                     |                    |
|---------------------|--------------------|
| Mr. William Symons. | Mr. William Terry. |
|---------------------|--------------------|

*Licentiates in Midwifery.*

|                     |                     |
|---------------------|---------------------|
| Mr. William Jones.  | Mr. Edward Downing. |
| William A. Summers. | Henry G. Rawdon.    |
| Thomas Gwynne.      | Thomas Joyce.       |
| John Candy.         |                     |

**Licentiates of the Apothecaries' Society.**

**JANUARY, 1859.**

Mr. William Smith Thomas. | Mr. William Jones.

**FEBRUARY.**

Mr. Owen Owen. | Mr. Joseph Lockwood.

**MARCH.**

Mr. Henry G. Rawdon.

**APRIL.**

Mr. William Terry. | Mr. Curtis James Bird.

**MAY.**

Mr. William Waring. | Mr. Matthew A. Adams.  
Egbert Charlton. | Thomas Holman.  
Charles Lovegrove.

**JUNE.**

Mr. John Candy.

**JULY.**

Mr. Buckmaster J. Tuck. | Mr. John Wales.  
Joseph F. Ashby. | Griffith William Roberts.

**AUGUST.**

Mr. Robert Hicks. | Mr. Allen Freshfield.  
James B. Hodgson. | Henry W. F. M. Lomas.  
Robert S. Newington.

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**APOTHECARIES' SOCIETY.**

**FIRST EXAMINATION.**

No lists published previous to this period.

**APRIL.**

Mr. Joseph May. | Mr. Joseph Brettell.  
Matthew Algernon Adams. | William Waring.

SECOND EXAMINATION.

JUNE.

Mr. Edgar B. Truman.  
Edward Fernie.  
John Wales.

Mr. John B. Bromley.  
Thomas Miller.

JULY.

Mr. John Thomas Mercer.  
Francis M. Cann.  
William Park.  
Walter Watkins.

Mr. Lionell Burrell.  
Isaac Morris.  
John Woodman.

AUGUST.

Mr. James Beddard.

GENTLEMEN WHO HAVE HELD THE APPOINTMENT OF  
HOUSE-SURGEON.

Mr. John Rand.  
James Broad.

Mr. George W. Martin.

GENTLEMEN APPOINTED DRESSERS SINCE OCTOBER, 1858.

Mr. George W. Martin.  
John Candy  
John C. Gooding.  
Newton Greenwood.  
John Wales.  
George Owen.  
Egbert Charlton.  
Bransby Brooks.  
Christopher Gayleard.  
Humphrey Williams.  
Henry Horsley.  
Allen Freshfield.

Mr. Charles Lovegrove.  
Gregory H. Atwell.  
Robert Barlow.  
Octavius Shepherd.  
Thomas Kitchener.  
Buckmaster J. Tuck.  
Thomas Holman.  
Alfred Hopkins.  
David Bowen.  
William Salmon.  
J. Garside Terry.  
John Daniel Hill.

DRESSERS TO THE ASSISTANT-SURGEONS.

Mr. Thomas Holman.  
Charles Lovegrove.  
J. J. Sewell.  
B. Simmons.  
J. S. Benson.  
T. Kitchener.  
G. D. Harding.  
Richard Davy.

Mr. G. H. Atwell.  
E. B. Truman.  
A. L. Haynes.  
D. Bowen.  
F. M. Cann.  
W. T. Salmon.  
E. Hunt.  
E. Applebee.

Mr. J. S. Tuke.  
H. Bennett.  
J. Brettell.  
John Simmonds.  
Frank Buszard.  
G. A. Major.  
J. F. Lovegrove.  
John Cook.  
E. Fernie.  
John Woodman.

Mr. E. W. Coleman.  
Cuthbert Johnson.  
Isaac Morris.  
Henry W. Lomas.  
J. B. M. Evans.  
J. S. Benson.  
J. A. Swain.  
Belgrave Ninnis.  
Joseph May.

---

**DRESSERS IN THE OPHTHALMIC WARDS.**

Mr. N. Greenwood.  
G. M. Bacon.  
B. Simmons.  
T. Holman.  
J. G. Terry.  
G. H. Atwell.

Mr. G. White Martin.  
M. A. Adams.  
William Terry.  
Richard Davy.  
G. D. Harding.

---

**GENTLEMEN APPOINTED CLINICAL CLERKS.**

*Winter Session, 1858-9.*

Mr. G. M. Bacon.  
B. J. Tuck.  
J. G. Terry.  
Octavius Shepherd.  
Thomas Miller.  
J. S. Tuke.  
J. M. Bright.

Mr. W. Moxon.  
T. Kitchener.  
C. Lovegrove.  
James Braithwaite.  
M. H. Aikins.  
A. J. Harrison.

*Summer Session, 1859.*

Mr. G. D. Harding.  
E. B. Truman.  
J. S. Benson.

Mr. B. Simmons.  
Hugh Bennett.  
Richard Davy.

---

**GENTLEMEN APPOINTED TO CONDUCT THE  
POST-MORTEM EXAMINATION.**

Mr. J. M. Beaumont.  
J. C. Gooding.  
T. Gwynne.  
W. Coleman.  
W. A. Evans.  
Octavius Shepherd.

Mr. J. D. Harding.  
Edward Applebee.  
A. L. Haynes.  
N. Greenwood.  
Thomas Miller.



**PUPIL'S PHYSICAL SOCIETY'S PRIZE.**

**Awarded to Mr. Gregory Haines Atwell.**

**SENIOR RESIDENT OBSTETRIC CLERKS.**

|                 |   |   |   |                       |
|-----------------|---|---|---|-----------------------|
| September, 1858 | . | . | . | Mr. Enoch Robinson.   |
| October      „  | . | . | . | John Wilson.          |
| November    „   | . | . | . | George F. Spry.       |
| December    „   | . | . | . | Christopher Gayleard. |
| January, 1859   | . | . | . | Stafford Benson.      |
| February    „   | . | . | . | George M. Bacon.      |
| March       „   | . | . | . | Benjamin Simmons.     |
| April       „   | . | . | . | W. S. Thomas.         |
| May         „   | . | . | . | H. G. Sadler.         |
| June        „   | . | . | . | John C. Gooding.      |
| July         „  | . | . | . | Newton Greenwood.     |
| August      „   | . | . | . | John Candy.           |

**HONORARY OBSTETRIC CERTIFICATES**

**Awarded since October, 1858, for attending above 100 cases of labour during Twelve Months.**

|                   |                    |
|-------------------|--------------------|
| Mr. E. B. Truman. | Mr. G. D. Harding. |
| Walter Watkins.   | Richard Davy.      |
| G. Calvert.       | J. Tanner.         |
| F. M. Cann.       | Dr. M. H. Aikins.  |
| John Wilson.      | Mr. J. F. Stamper. |
| William Soper.    |                    |

**NUMBER OF CASES OF LABOUR ATTENDED DURING 1858-9.**

|                 |   |   |      |
|-----------------|---|---|------|
| September, 1858 | . | . | 158  |
| October      „  | . | . | 150  |
| November    „   | . | . | 131  |
| December    „   | . | . | 149  |
| January, 1859   | . | . | 118  |
| February    „   | . | . | 136  |
| March       „   | . | . | 140  |
| April       „   | . | . | 132  |
| May         „   | . | . | 134  |
| June        „   | . | . | 124  |
| July         „  | . | . | 143  |
| August      „   | . | . | 171  |
| Total           | . | . | 1686 |

# GUY'S HOSPITAL,

1859-60.

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## THE MEDICAL SESSION

COMMENCES ON THE FIRST OF OCTOBER.

THE INTRODUCTORY ADDRESS will be given by Dr. S. O. HABERSHON, on Saturday, the First of October, at Two o'clock.

Gentlemen desirous of becoming Students must produce satisfactory testimony as to their Education and Conduct; they are required to pay £40 for the first year, £40 for the second year, and £10 for every succeeding year of attendance. One payment of £100 entitles a Student to a perpetual Ticket.

The payment for the year admits to the Lectures, Practice, and all the privileges of a Student for that year only.

Clinical Clerks, Dressers, Ward Clerks, Dressers' Reporters, Obstetric Residents, and Dressers in the Eye-Wards, are selected according to merit from those Students who have attended a second year. Each Dresser (except those in the Eye-Wards) has the privilege of rooms and commons in the Hospital free of charge for one month of his course. The Obstetric Residents have the like privilege for two months each—one month as junior, another as senior. A Resident House-Surgeon is appointed every six months from those Students who have obtained the College Diploma.

Every Student is required to conform to the Rules and Regulations for the internal management of the Hospital.

The privileges of a Student will be withdrawn in the event of neglect or misconduct.

Certificates will not be given for Lectures or Practice, unless duly attended.

The Winter Session terminates March 31st.

The Summer Session commences May 2d, and concludes July 30th.

## VOLUNTARY EXAMINATIONS

WILL BE HELD AT FOUR PERIODS OF THE STUDENT'S COURSE  
AS FOLLOWS :

**FIRST.**—At Entrance ; and will take place on Monday, Oct. 17th. It will comprise Elementary Classics, Ancient and Modern History, and Mathematics. The Candidate who shall distinguish himself the most, will receive £25 ; the second Candidate £20 ; and the third, £15.

**SECOND.**—At the end of July in the first year, on all the Subjects of the first year's Course of Study, one sum of £30, and another of £25, will be given according to proficiency.

**THIRD.**—At the end of July in the second year, on the Subjects which form the Course of Study up to that time. £35, and £30.

**FOURTH.**—At the end of July of the third year, on all the Subjects of the Curriculum. £40, and £35.

**HONORARY CERTIFICATES** will be given to those Candidates who pass a creditable Examination.

---

## SPECIAL EXAMINATION.

**TWO GOLD MEDALS** will be given annually by the Treasurer to Students at the end of their third year : one for Clinical Medicine, and the other for Clinical Surgery.

## SINGLE COURSES OF LECTURES

MAY BE ATTENDED ON THE FOLLOWING TERMS:

Anatomy, Physiology, Demonstrations and Dissections, Medicine, Surgery, Chemistry, Midwifery, on the Payment of Five Guineas for each Course of Lectures.

Materia Medica, Medical Jurisprudence, Botany, Practical Chemistry, Comparative Anatomy, Manipulative and Operative Surgery, on the Payment of Four Guineas for each Course.

Fee for Attendance on either the Medical or Surgical Practice of the Hospital:

|                            |   |   |   |                      |
|----------------------------|---|---|---|----------------------|
| Three Months               | - | - | - | Ten Guineas.         |
| Six Months                 | - | - | - | Fifteen Guineas.     |
| Twelve Months or Perpetual |   |   |   | Twenty-five Guineas. |

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## MEDICAL OFFICERS.

*Physicians.*—THOMAS ADDISON, M.D.; G. H. BARLOW, M.D.; OWEN REES, M.D., F.R.S.; W. W. GULL, M.D.

*Assistant Physicians.*—S. O. HABERSHON, M.D.; S. WILKS, M.D.; F. W. PAVY, M.D.

*Surgeons.*—EDWARD COCK, Esq.; J. HILTON, Esq., F.R.S.; J. BIRKETT, Esq.

*Assistant Surgeons.*—ALFRED POLAND, Esq.; COOPER FORSTER, Esq.; T. BRYANT, Esq.

*Obstetric-Physician.*—HENRY OLDHAM, M.D.

*Assistant Obstetric-Physician.*—J. BRAXTON HICKS, M.D.

*Surgeon-Dentists.*—T. BELL, Esq., F.R.S., and PRES. L.S.; J. SALTER, Esq.

*Surgeon of the Eye-Infirmity.*—JOHN F. FRANCE, Esq.

*Apothecary.*—JAMES STOCKER, Esq.

## LECTURES, &amp;c.

## WINTER COURSES.

*Medicine.*—DR. OWEN REES and DR. GULL, Mondays, Wednesdays, and Fridays, at half-past three.

*Clinical Medicine.*—DR. ADDISON, DR. BARLOW, DR. OWEN REES, and DR. GULL.

*Surgery.*—MR. HILTON and MR. BIRKETT, Tuesdays, Thursdays, and Saturdays.

*Clinical Surgery.*—MR. COCK, MR. HILTON, and MR. BIRKETT.

*Anatomy, Descriptive and Surgical.*—MR. POLAND and MR. COOPER FORSTER, Mondays, Tuesdays, Thursdays, Fridays, and Saturdays, at nine.

*Physiology and Microscopic Anatomy.*—DR. PAVY, Tuesdays, Thursdays, and Saturdays, at twelve.

*Demonstrations on Anatomy.*—MR. DURHAM and MR. MOXON, daily.

*Demonstrations on Morbid Anatomy.*—DR. WILKS, daily, at half-past two.

*Clinical Lectures on Midwifery and Diseases of Women.*—DR. OLDHAM.

*Chemistry.*—DR. ALFRED S. TAYLOR, Tuesdays, Thursdays, and Saturdays, at eleven.

*Moral Philosophy.*—THE REV. T. H. BULLOCK, M.A., Chaplain to the Hospital.

*Experimental Philosophy.*—MR. DURHAM, Wednesdays, at eleven.

*Pupils' Physical Society.*—Saturdays, alternate, at seven in the evening.

*The Clinical Wards* will open the first week in October.

*Lying-in Charity.*—DR. OLDHAM and DR. J. BRAXTON HICKS.

*Curator of the Museum.*—DR. WILKS.

## SUMMER COURSES.

*Demonstrations on Cutaneous Diseases.*—DR. ADDISON and DR. GULL, Mondays, at half-past one.

*Materia Medica*.—DR. HABERSHON, Tuesdays, Thursdays, and Saturdays, at three.

*Clinical Medicine*.—DR. HABERSHON, DR. WILKS, and DR. PAVY.

*Clinical Surgery*.—MR. POLAND, MR. COOPER FORSTER, and MR. BRYANT.

*Midwifery*.—DR. OLDHAM, Tuesdays, Wednesdays, Thursdays, Fridays, and Saturdays, at a quarter to nine.

*Medical Jurisprudence*.—DR. ALFRED S. TAYLOR, Tuesdays, Thursdays, and Saturdays, at ten.

*Ophthalmic Surgery*.—MR. FRANCE, Wednesdays and Fridays, at three.

*Pathology*.—DR. WILKS, Mondays, at twelve.

*Dental Surgery*.—MR. SALTER.

*Comparative Anatomy*.—DR. PAVY, Wednesdays and Fridays, at twelve.

*Botany*.—MR. JOHNSON, Tuesdays, Thursdays, and Saturdays, at half-past eleven.

*Practical Chemistry*.—DR. ODLING, Mondays, Wednesdays, and Fridays, ten to one.

*Operative and Manipulative Surgery*.—MR. BRYANT, Mondays, at three.

*The Clinical Wards* will open the first week in May.

*Registrars*.—*Medical*—DR. WHITLEY ; *Surgical*—MR. BRYANT.

MR. DURHAM and MR. MOXON will assist Pupils in their Studies.

THE LIBRARY, MUSEUMS, AND MODEL-ROOMS, ARE OPEN DAILY TO THE STUDENTS, FROM NINE O'CLOCK A.M., TILL FIVE O'CLOCK P.M.

MR. STOCKER, *Apothecary to Guy's Hospital*, is authorised to enter the Names of Students.

# ASTLEY COOPER PRIZE.

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## **The Seventh Triennial Prize of Three Hundred Pounds,**

*Under the Will of the late SIR ASTLEY COOPER, Bart.,*

WILL BE AWARDED TO

THE AUTHOR OF THE BEST ESSAY OR TREATISE

**"ON THE ANATOMY, PHYSIOLOGY, AND  
PATHOLOGY OF THE HUMAN PANCREAS."**

THE Condition annexed by the Testator is, "That the Essays or Treatises written for such Prize shall contain original experiments and observations, which shall not have been previously published; and that such Essays or Treatises shall (as far as the subject shall admit of) be illustrated by preparations and drawings, which preparations and drawings shall be added to the Museum of Guy's Hospital, and shall, together with the Work itself and the sole and exclusive interest therein and the copyright thereof, become thenceforth the property of the Hospital, and be transferred as such by the successful candidate."

It is the will of the Founder that no Physician, or Surgeon, or other officer for the time being, of Guy's Hospital or of St. Thomas's Hospital, nor any person related by blood or affinity to any such Physician, or Surgeon, or other officer for the time being, shall at any time be entitled to claim the Prize; but, with the exception here referred to, this (the Astley Cooper) Prize is open for competition to the whole world.

Candidates are informed that their Essays, either written in the English language, or, if in a Foreign Language, accompanied by an English translation, must be sent to Guy's Hospital on or before January 1st, 1862, addressed to the Physicians and Surgeons for Guy's Hospital.

Each Essay or Treatise must be distinguished by a Motto, and be accompanied by a sealed envelope containing the Name and Address of the Writer. None of the envelopes will be opened, except that which accompanies the successful Treatise. The unsuccessful Essays or Treatises, with the illustrative preparations and drawings, will remain at the Museum of Guy's Hospital until claimed by the respective writers or their agents.













